DEN NORSKE NORDHAVS-EXPEDITION

1876—1878.

VI.

ZOOLOGI.

HOLOTHURIOIDEA,

VED

D. C. DANIELSSEN OG **JOHAN KOREN.**

MED 13 PLANCHER OG 1 KART.

CHRISTIANIA.
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THE NORWEGIAN NORTH-ATLANTIC EXPEDITION

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ZOOLOGY.

HOLOTHURIOIDEA,

BY

D. C. DANIELSSEN AND JOHAN KOREN.

WITH 13 PLATES AND 1 MAP.

CHRISTIANIA.
PRINTED BY GRØNDAHL & SØN.
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De Holothurider, som ere indsamlede paa den norske Nordhavs-Expeditions trende Undersøgelsesreiser i Aarene 1876, 1877 og 1878, have vi underkastet en kritisk Gjennemgaaelse, hvis Resultater vi her fremlægge.

Det viser sig, at Samlingen indeholder 17 Slægter, hvoraf 5 ere nye, og 25 Arter, af hvilke 6 ere nye for Videnskaben. Tages der Hensyn til, under hvilke Bredde- og Længdegrader de væsentligste Fund ere gjorte, tør det indrømmes, at Antallet er betydeligt, og sikkert er det, at de arktiske Have ere blevne berigede med interessante Former for denne Dyreklasses Vedkommende.

For at opretholde Expeditionens Prioritetsret have vi i "Nyt Magazin for Naturvidenskaberne" offentliggjort flere foreløbige Afhandlinger over de nye Holothurider, til hvilke vi maa henvise.

The *Holothuriidæ* obtained on the three exploring voyages of the Norwegian North-Atlantic Expedition, in the years 1876, 1877, and 1878, we have submitted to a critical review, the results of which will be found embodied in the present Memoir.

The whole collection comprises 17 genera, 5 of which were previously unknown, and 25 species, 6 of them new to science. If regard be had to the latitude and longitude of the localities in which the most important of the specimens were met with, the total number secured will, we think, be deemed considerable; and it is certain that, as regards at least this class of animals, interesting forms have been added to the Fauna of the Polar Seas.

With the object of asserting the right of priority to which the Expedition can lay claim, we have published in "Nyt Magazin for Naturvidenskaberne" several preliminary papers on the new *Holothuriidæ*, to which we refer.

Tempereret Area.
(Warm Area.)

Stat. No.	Nordlig Bredde. (North Latitude.)	Længde fra Greenwich. (Longitude.)	Dybde. (Depth.) Engl. Favne. (Fathoms.)	Meter. (Metres.)	Bundens Temperatur (Temperature at Bottom) C.	Bunden.	Bottom.
1	61° 13′	6° 36′ E.	650	1189	+6.°6	Sandler.	Sabulous Clay.
2	61 9.6	6 31.9	672	1229	6. 7	Sandler.	Sabulous Clay.
9	61 29.8	3 36.5	206	377	5. 9	Ler.	Clay.
10	61 41.1	3 18.5	220	402	6. 0	Slik og Ler.	Ooze and Clay.
25	63 10.2	5 24.5	98	179	6. 9	Sandler.	Sabulous Clay.
79	64 48.2	6 35.6	155	283	6. 9	Sandler.	Sabulous Clay.
92	64 0	6 42	178	326	7. 2	Ler.	Clay.
101	65 36	8 32	223	408	6. 0	Ler.	Clay.
149	67 52.5	13 57.5	135	272	4. 9	Ler.	Clay.
260	70 54.8	26 11	127	475	3. 5	Ler.	Clay.
261	70 47.5	28 30	127	232	2. 8	Ler.	Clay.
273	73 25	31 30	197	360	2. 2	Graagrønt Ler.	Greyish-green Clay.
280	74 10.5	18 51	35	64	1. 1	Haard Bund.	Hard Bottom.
290	72 27	20 51	191	349	3. 5	Sandholdigt Ler.	Sandy Clay.
322	74 57	19 52	21	38	0. 2	Haard Bund.	Hard Bottom.
323	72 53.5	21 51	223	408	1. 5	Brungraat Ler.	Brownish-grey Clay.
326	75 31.5	17 50	123	225	1. 6	Graagrønt Ler.	Greyish-green Clay.
336	76 19	15 42	70	128	0. 4	Haard Bund. Lidt Ler.	Hard Bottom.
363	80 3	8 28	260	475	1. 1	Blaat Ler.	Blue Clay.

Kolde Area.
(Cold Area.)

Stat. No.	Nordlig Bredde. (North Latitude.)	Længde fra Greenwich. (Longitude.)	Dybde. (Depth.) Engl. Favne. (Fathoms.)	Meter. (Metres.)	Bundens Temperatur. (Temperature at Bottom) C.	Bunden.	Bottom.
18	62° 44.5′	1° 48′ E.	412	753	—1.°0	Ler.	Clay.
33	63 5	3 0	525	960	—1. 1	Ler.	Clay.
35	63 17	1 27 W.	1081	1977	—1. 0	Ler.	Clay.
40	63 22.5	5 29	1215	2222	—1. 2	Sandler.	Sabulous Clay.
51	65 53	7 18	1163	2127	—1. 1	Biloculinler.	Biloculina Clay.
53	65 13.5	0 33 E.	1539	2814	—1. 3	Biloculinler.	Biloculina Clay.
96	66 8.5	3 0	805	1472	—1. 1	Biloculinler.	Biloculina Clay.
137	67 24	8 58	452	827	—1. 0	Meget haardt Ler.	Very hard Clay.
192	69 45.7	16 15	649	1187	—0. 7	Sandler.	Sabulous Clay.
240	69 2	11 26 W.	1004	1836	—1. 1	Biloculinler.	Biloculina Clay.
248	67 56.5	4 11 E.	778	1423	—1. 4	Biloculinler.	Biloculina Clay.
267	71 42	37 1	148	271	—1. 4	Ler, Sten.	Clay, Shingle.
270	72 27.5	35 1	136	249	—0. 0	Graagrønt Ler.	Greyish-green Clay.
283	73 47.5	14 21	767	1403	—1. 4	Biloculinler.	Biloculina Clay.
295	71 59	11 40	1110	2030	—1. 3	Biloculinler.	Biloculina Clay.
303	75 12	3 2	1200	2195	—1. 6	Biloculinler.	Biloculina Clay.
312	74 54	14 53	658	1203	—1. 2	Brunt og grønt Ler.	Brown and grey Clay.
338	76 19	18 1	146	267	—1. 1	Haard Bund.	Hard Bottom.
353	77 58.5	5 10	1333	2438	—1. 4	Biloculinler. Sten.	Biloc. Clay. Stone.
362	79 59	5 40	459	839	—1. 0	Blaagraat Ler.	Bluish-grey Clay.

Dr. H. Théel har af det Materiale, der fra Challenger-expeditionen er overdraget ham til Bearbeidelse, fundet sig foranlediget til, for Holothuridernes Vedkommende, at danne en ny Orden, som han kalder *Elasmopoda*[1], og hvortil Familien *Elpididæ* med flere nye Slægter ere henførte. Til denne Familie maa vi føie følgende to Slægter, nemlig *Kolga* og *Irpa*.

Kolga[2] hyalina, n. g. n. sp.
(Tab. I—III)

Dyret varierer noget i Størrelse; men de største Exemplarer, vi have havt til vore Undersøgelser, ere 50^{mm} lange, 15—20^{mm} høje og 12—15^{mm} brede. Kroppen er udpræget bilateral. Paa Legemets forreste, tvers afskaarne Ende sees den mod Bugfladen vendende Mundskive, paa hvis Midte findes den runde Mundaabning, Fig. 2, *a*, og hvis Rand er forsynet med 10 næsten retraktile Tentakler, Fig. 2, *b*. Disse ere i udstrakt Tilstand 4^{mm} lange, ere paa deres yderste Ende femlappede. Enhver Lap har 3 Flige, hvoraf den midterste er den længste og tykkeste, Fig. 6, 7.

Bugen er næsten plan; kun naar Dyret er meget udspændt af Vædske, bliver den lidt convex.

Ryggen er stærkt hvælvet, og henimod den forreste Ende, omtrent 4^{mm} fra Tentakelranden, findes en paatvers gaaende kraveformig Fremstaaenhed, paa hvis buedannede Rand sees 6 cylindriske, konisk tilspidsede Papiller, af hvilke de 2 midterste ere de tykkeste og længste, omtrent 1.5^{mm} lange, de to yderste ere temmelig smaa; men samtlige ere paa deres Spidser hvidglindsende, Fig. 1, *a*. Disse Papiller (Rygfødder?) forkortes og forlænges uden egentlig at kunne trækkes ind i Legemet, og naar de ere saavidt sammentrukne, at kun Spidserne sees, da kunne de ganske skjules, idet Dyret drager en Hudfold (Grunden af Kraven) over dem ligesom en Kappe. Foran Kraven bliver Legemet smalere og mere rundt og danner en Slags Hals, idet den forreste Ende af Kroppen er noget bredere, saa

[1] Preliminary Report on the *Holothuridæ*, of the exploring voyage of H. M. S. 'Challenger.' Bihang til K. Svenska Vet. Akad. Handlingar, B. 5, No. 19.

[2] En af Havgudindens Døttre i den nordiske Mythologi.

The researches of Dr. H. Théel in connexion with materials from the 'Challenger' Expedition submitted to that naturalist for revision, have led him to institute a new order of *Holothuriidæ*, which he designates *Elasmopoda*,[1] classing under it the family *Elpididæ*, with divers new genera. As additional members of that family, the two following genera, *Kolga* and *Irpa*, must be referred.

Kolga[2] hyalina, n. g. n. sp.
(Pl. I—III).

This animal varies in size; but the largest specimens we have met with did not exceed 50^{mm} in length, 15—20^{mm} in height, and 12—15^{mm} in breadth. The trunk is prominently bilateral. At the anterior, obtuse extremity of the body, facing the ventral surface, occurs the oral disk, in the centre of which is seen the round buccal aperture, fig. 2, *a*, the margin being furnished with 10 almost retractile tentacula, fig. 2, *b*. These tentacula, when extended, are 4^{mm} long, and, at their extremities, five-lobed. Each lobe is subdivided into 3 lobules, that in the middle being longest and thickest, figs. 6, 7.

The belly is almost flat; only when the animal blows itself out with water, does the ventral surface assume some slight appearance of convexity.

The back is sharply rounded, and near the anterior extremity, about 4^{mm} from the tentacular margin, occurs a transverse jugal protuberance, along the arcuated border of which is seen a series of cylindric, acuminate papillæ, the medial pair thickest and longest, about 1.5^{mm} in length; the outermost two are rather short: they are all of them tipped at the points with lustrous white, fig. 1, *a*. These papillæ (dorsal suckers?) are contracted and expanded at the will of the animal, though not strictly retractile; and when shrunk so as to leave the points only visible, they admit of being wholly concealed, the animal drawing over them a membranous fold (the base of the jugal protuberance), with which they are covered as with a mantle. Anterior to the jugal protuberance, or collar, as we may

[1] Preliminary Report on the *Holothuridæ*, of the exploring voyage of H. M. S. Challenger.' Bihang til K. Svenska Vet. Akad. Handlingar, B. 5, No. 19.

[2] One of the daughters of Ran, the sea-goddess of Northern Mythology.

at Mundskiven faar Udseende af et Hoved, der altid bøier sig mod Bugfladen, Fig. 2.

Noget foran Kraven, som oftest skjult af denne, sees to meget smaa Aabninger, skilte fra hinanden ved en liden Fold, af hvilke den for Generations-Organets Udførselskanal er lidt fremspringende, imedens den anden, der fører ind til Stenkanalen, er i Niveau med Huden. Paa Rygsidens bagerste Del findes den store, runde Kloakaabning, Fig. 1, *b*.

Paa begge Sider af Kroppen, just der hvor Bug og Ryg støde sammen, sees en Række tykke, lange, koniske Fødder, der fortsættes omkring Dyrets bagerste afrundede Ende, Fig. 2 *c*, *c*. I Regelen er der 5 paa hver Side, og 6 omkring Enden, ialt 16; men paa et Antal af 40 Exemplarer talte vi 18 Fødder paa et, og 14 paa to.

Fødderne ere paa Siderandene stillede ligeoverfor hverandre, og det første Fodpar tager i Almindelighed sit Udspring lidt bagenfor Kraven, — dog varierer dette noget; thi hos enkelte staa første Fodpar ganske i Linie med Kraven, imedens de hos andre staa temmelig fjernet fra den, Fig. 1, 2. En lignende Variation finder ogsaa Sted med Hensyn til Afstanden imellem Fødderne indbyrdes, saaledes nemlig, at der stundom kan være et stort Rum mellem første og anden Fod, og hos enkelte andre staa disse Fødder tættere sammen. De kunne ikke ganske indtrækkes, og naar deres Spids indkrængedes, fremkom en Grube.

Ved Roden af hver Fod iagttages paa Bugfladen, gjennem den temmelig klare Hud, en aflang Fodampulle, Fig. 2, *d*, der ligger fæstet til den indre Hudflade, og fra hvis indre Ende udgaa to Muskelbaand, der strække sig hen til den midterste Længdemuskel, Fig. 2, *e*.

Legemets Overflade er ved 5 Længdemuskler delt i 5 Felter, 2 tilhørende Biviet, 3 Triviet. Disse Længdemuskler have temmelig tykke Rande, men ere meget tynde paa Midten, saa at den derunder liggende Nervetraad skinner igjennem og giver sig tilkjende som en skarp Linie, der ligesom deler Muskelen i to Dele, Fig. 2.

Huden.

Huden er meget gjennemsigtig, tynd, glat, blød, slimet og kontraktil.

Cuticula er overordentlig tynd, vandklar, strukturløs og tæt bunden til det underliggende Epithel eller Subcuticularlag, hvoraf den er et Produkt, Fig. 10, *a*.

Epithelet bestaar af et Lag temmelig lange Cylinderceller, som ere bredere ved Grunden, der er fæstet til Corium, og smalere mod Cuticula, Fig. 10, *b*. Dels imel-

call it, the body grows narrower and more cylindrical, forming, as it were, a neck, the anterior extremity of the trunk having a somewhat greater breadth, which gives to the oral disk the appearance of a head constantly inclining towards the ventral surface, fig. 2.

A little in advance of the collar, by which as a rule they are hidden, occur two minute openings, separated from each other by a small intervening fold; one of these, the genital pore, is somewhat gibbous, whereas the other, leading to the "sand-canal," or madreporic tubercle, is in a plane with the integument. On the posterior portion of the dorsal surface occurs the large circular cloacum, or anal orifice, fig. 1, *b*.

On either side of the body, exactly in the line of junction of the dorsal and ventral regions, are seen a series of long, thick, conic suckers, extending round the curved posterior extremity of the animal, fig. 2, *c*, *c*. Most individuals have 5 on each side, and 6 bordering the extremity, 16 in all; but of 40 specimens examined, one had 18 suckers, and two, 14.

Along the lateral margins, these suckers are disposed in opposite series, the first pair generally having its origin a little posterior to the jugal protuberance; this, however, is not a strictly constant feature, the first pair of suckers being in some examples contiguous to the collar; whereas in others, the space between is considerable, figs. 1; 2. A corresponding variation as to distance characterises, too, the arrangement of the suckers *inter se;* the first and second suckers, for instance, are in some individuals comparatively distant, but in others more closely set. They do not any of them admit of being fully retracted, and on forcibly invaginating the points, a small cavity or depression was produced.

At the base of every sucker, on the ventral plane, may be discerned through the semi-translucent membrane an ovate pedal ampulla, fig. 2, *d*, attached to the inner surface of the skin, from the inner extremity of which two muscular bands are seen to issue, extending from thence to the medial longitudinal muscle, fig. 2, *e*.

Five longitudinal muscles divide the upper surface of the body into as many segments, two of which constitute the bivium, and the remaining three the trivium. These longitudinal muscles have thickish margins; but in the middle they are exceedingly thin, and the nervous chord beneath is distinctly perceived, bisecting, as it were, like a sharply drawn line, the muscle it traverses, fig. 2.

Skin.

The integument is in a high degree translucent, tenuous, soft, smooth, mucid, and contractile.

The cuticle is remarkably thin, pellucid, simple, and closely webbed to the epithelium, or subcuticular stratum, underlying it, of which indeed it is a product, fig. 10, *a*.

The epithelium consists of a layer of comparatively deep cylindric cells, somewhat broader at the base, which is attached to the corium, than at the apex, or cuticular

lem disse Celler, dels ved deres Grund findes i større og mindre Mængde isolerede, store, kuglerunde eller pæredannede Legemer, der ere 0,026mm brede, bestaa af en tyk, gjennemsigtig Membran, have en stor Kjerne med Kjernelegeme, og et kornet seigt Indhold, der holdes sammen i en Klump efter at være presset ud af Legemet, Fig. 10, *d, d.* De runde Legemer have et halvmaaneformigt Indsnit paa den Side, der vender ud mod Cuticula, Fig. 25, *a*, og i dette Indsnit formene vi at have bemærket en rund Aabning, der stundom var udfyldt af det seige Indhold, Fig. 10, *e, c.* De aflange pæreformige Legemer have en Udførselsgang, der gaar op imellem Epithelcellerne og kan forfølges lige ud til Cuticula, Fig. 10, *d, d.*

Disse Legemer findes saagodtsom overalt i Huden, men i størst Mængde ere de dog paa Mundskiven rundt om Tentakelgrunden, hvor de ligge Side om Side. Vi anse dem for encellede Kjertler, der afsondre Slim og høre Epithellaget til, ihvorvel vi fandt enkelte hist og her i det Epithelet tilgrændsende Bindevæv. Omendskjønt disse Organer ere, saavidt os bekjendt, enestaaende hos de hidtil undersøgte Holothurider, kunne vi dog ikke betvivle, at deres Funktion er at forsyne Huden med den Slim, hvoraf der findes en saa stor Mængde paa Legemets Overflade.

Dr. Teuscher[1] har i Huden hos *Holothuria tubulosa* fremstillet aflange Celler imellem Epithelcellerne, hvilke han antager for at være Slimkjertler; ogsaa vi have seet disse; men have ikke fundet, at de i nogen væsentlig Grad adskille sig fra det Epithel, hvor imellem de findes. Ogsaa Semper[2] har paavist aflange Celler i Bindevævet, som han kalder Slimceller; disse findes jævnligen i Bindevævslagene hos Slægterne *Trochostoma, Irpa* og *Kolga;* men vi kunne ikke antage dem for Kjertler, da de, som vi tidligere have antydet, ere Bindevævslegemer, der formentlig tjene til at opretholde Bindevævet[3].

Umiddelbart til Epithelet, men indenfor dette, støder Bindevævslaget, der er temmelig bredt, hyalint og forsynet med en Mængde Bindevævslegemer, Fig. 10, *e, e,* der paa enkelte Steder ligge tæt ved hinanden; de have en forskjellig Form, snart ere de ovale med en eller to Udløbere, snart næsten runde, og snart have de et kornet Indhold, og svare da ganske til Sempers Slimceller. Det er ganske mærkeligt, at Bindevævslaget er gjennemgaaende hyalint, meget kjærnerigt, uden at være fibrillært, hvilket ikke er almindeligt for Holothuridernes Hud, der jo altid har et tykkere eller tyndere Lag fibrillært Bindevæv.

[1] Jenaische Zeitschrift, 10 Band, pag. 558. Jena 1876.
[2] Reisen im Archipel der Philippinen, 2 Theil, 1 Band, pag. 165. Leipzig 1868.
[3] Nyt Magazin for Naturvidenskaberne, 24de Bind, pag. 231. Christiania 1878.

termination, fig. 10, *b.* Dispersed between the cells and at their bases, occur an indefinite number of large, isolated, globose or pyriform corpuscles, 0.026mm in breadth. These corpuscles consist of a thick diaphanous membrane, investing a large nucleus and a nucleolus, the contents of which, a viscid, granulous substance, if squeezed out, will adhere together in a lump, fig. 10, *d. d.* The globular corpuscles exhibit a lunate incision on the part facing the cuticle, fig. 25, *a;* and in this incision there would appear to be a circular aperture, sometimes filled with the aforesaid glutinous mass, fig. 10, *c, c.* The ovate, pyriform corpuscles are provided with an excretory canal, which, protending upwards between the cells of the epithelium, may be traced straight to the cuticle, fig. 10, *d, d.*

The skin is almost everywhere studded with these corpuscles; they are most numerous however on the buccal disk, bordering the base of the tentacles, where indeed they approximate, being there placed side by side. We regard these corpuscles as secretory unicellular glands belonging to the epithelium; a few do, however, occur every here and there in the connective tissue adjoining that layer. These organs are, we conceive, peculiar to the present species, having never, so far as we are aware, been observed in any of the known *Holothuriidæ*; yet their function must assuredly be to furnish the skin with the mucous secretion so copiously diffused over the surface of the body.

Dr. Teuscher[1] has figured in the skin of *Holothuria tubulosa*, among the cells of the epithelium, ovate cells, which he conceives to be mucous glands; we have also discerned these cells, but have failed to detect any essentially characteristic feature distinguishing them from the cells of the epithelium, among which they are dispersed. Semper,[2] too, has shown the occurrence of ovate cells in the connective tissue, which he terms mucous cells; they are commonly characteristic of the connective tissue in the genera *Trochostoma, Irpa,* and *Kolga;* but we cannot agree in deeming them glands, since, as we indicated on a former occasion, they must be merely corpuscles of connective tissue, to which they are probably in some manner subservient.[3]

Adjoining, but within, the epithelium, extends the layer of connective tissue, rather broad, hyaline, and furnished with numerous corpuscles of connective tissue, fig. 10, *e, e,* which, in places, are crowded together; they vary in form, some being ovate and some almost spheroid; others contain a granulous substance, and hence are the exact analogue of Semper's mucous cells. It is remarkable that the layer of connective tissue in this species should be invariably hyaline, abounding in corpuscles, without being in the slightest degree fibrillous, a feature not hitherto met with in the skin of known *Holothuriidæ,* which is always distinguished by a layer of fibrillous tissue, more or less thick.

[1] Jenaische Zeitschrift, 10 Band, pag. 558. Jena 1876.
[2] Reisen im Archipel der Philippinen, 2 Theil, 1 Band, pag. 165. Leipzig 1868.
[3] Nyt Magazin for Naturvidenskaberne, 24de Bind, pag. 231. Christiania 1878.

Til den indvendige Flade af Bindevævet er Muskellaget fæstet. Det dannes af Tver- og Længdemuskler.

Tvermusklerne, Tab. III, Fig. 26, *a*, *a*, ere temmelig smale, men sammenbundne ved et hyalint, kalkfrit Bindevæv til en sammenhængende Hud. De gaa fra den ene Længdemuskel til den anden, stundom gaa de henimod Midten af Længdemuskelen, hvor de da ophøre, aldrig gaa de over Radialnerven eller Radialkarret. De kunne følgelig ikke faa Benævnelsen Ringmuskler, da de ikke gaa fortløbende rundt Legemet; men kunne langt bedre benævnes Tvermuskler, da de udfylde 5 Felter, der fremkomme ved Længdemusklernes Anordning. Enhver saadan Tvermuskel bestaar af en Mængde Muskelfibriller, sammenbundne med Bindevæv.

Længdemusklerne ere 5, Tab. III, Fig. 26, *e*. Enhver Muskel har en Bredde af 1,4^{mm}, er fæstet til Huden ved en Mængde temmelig stærke Bindevævstraade, og indtager Dyrets hele Længde. De aftage noget i Bredde, saavel mod den forreste som bagerste Ende. Fortil fæste de sig paa Mundskivens yderste Rand, just ved Grunden af en Tentakel, sende Fibre hen til den indre Del af Mundskiven lige til Mundranden. Der, hvor Længdemusklerne fæste sig paa Skiveranden, fremkommer, idet Fibrene vige fra hverandre, et spidsvinklet Rum, der opfyldes af Radialnerven og Karret. Bagtil fæste de sig paa Kloaken rundt om dennes Aabning.

Længdemusklernes Fibriller ere forgrenede og anastomosere med hverandre. Hele Muskellaget er beklædt af et flimrende Peritoneum, der foruden Epithelet bestaar af et tyndt gjennemsigtigt Bindevæv, hvori sees enkelte Muskelfibre.

I det tidligere beskrevne hyaline Bindevæv findes lejret Kalklegemer af forskjellig Størrelse og Form og i forskjellig Mængde. Disse Kalklegemer ligge noget under Epithellaget og rage ikke op i dette. De fremtræde under 3 Former, nemlig som Spikler, som Rosetter og som Net.

Spiklerne findes overalt; men i størst Mængde paa Ryggen. De vise sig fornemmelig i to Størrelser, hvorfor vi ville benævne dem de smaa og de store Spikler.

De smaa Spikler ere mere eller mindre krumbøjede, kun enkeltvis ganske lige, have en Knude paa Midten, imedens Enderne ere tildels afstumpede og finttakkede, Fig. 11, *a*. De ligne meget de Spikler, som findes i Irpas Hud, kun ere de meget mindre, 0,024^{mm} lange og 0,002^{mm} tykke. Disse smaa Spikler ligge dels spredte enkeltvis, saasom paa Bugfladen, dels ere de sammenpakkede i Hobe, Fig. 11, Fig. 10, Fig. 22, dels indtage de et eller flere Lag.

To the inner surface of the connective tissue is attached the muscular layer, composed of transverse and longitudinal muscles.

The transverse muscles, Pl. III, fig. 26, *a*, *a*, are somewhat slender, but form a continuous muscular membrane, being webbed together by a layer of hyaline connective tissue, without a trace of calcareous deposit. They extend from one longitudinal muscle to the other, reaching sometimes almost to the middle of those muscles, where they terminate, never crossing the radial nerve or the radial vessel. Hence, the appellation of ring, or annular, muscles is incorrect, since they do not encircle the body; transverse muscles would be a more appropriate term, occupying as they do the 5 segments into which, by the arrangement of the longitudinal muscles, the surface of the body is divided. Each of these transverse muscles consists of numerous muscular fibrils, webbed together by connective tissue.

The longitudinal muscles are 5 in number, Pl. III, fig. 26, *e*. Each muscle has a breadth of 1.4^{mm}, is attached to the integument by a multitude of comparatively strong filaments of connective tissue, and protends throughout the entire length of the animal. At both extremities they experience a slight diminution in length. Anteriorly, they are affixed to the extreme margin of the oral disk, each at the base of a tentacle, and send off fibres to the inner portion of the disk, or rather to the edge of the oral orifice. These fibres abruptly diverging, an acute-angled space, occupied by the radial nerve and vessel, is marked off where the longitudinal muscles issue from the margin of the oral disk. Posteriorly, they are attached to the edge of the anal opening.

The fibrils of the longitudinal muscles are ramous, anastomosing one with the other. Over the whole of the muscular layer extends a ciliated peritoneum, which, in common with the epithelium, consists of thin, translucent connective tissue, in which may be discerned a few muscular fibrils.

In the hyaline connective tissue, described above, are calcareous corpuscles, varying alike in form, magnitude, and number. These calcareous corpuscles lie a little beneath the epithelial layer, none extending up into that division of the integument. They are triform, viz. spicular, flosculous, and reticulate.

The spiculæ are everywhere met with, but in greatest numbers on the back. The majority are of two magnitudes, and hence may be conveniently designated the small and the large spiculæ.

The small spiculæ are more or less inflexed, — but very few, and those isolated, occur strictly rectilinear, — bearing each a protuberance in the middle, and with obtuse or minutely serrated extremities, fig. 11 *a*. They closely resemble the spicules studding the integument in the genus *Irpa*, but are very much smaller, measuring only 0.024^{mm} in length and 0.002^{mm} in thickness. A threefold arrangement characterises these diminutive spiculæ, some occurring isolated,

Det er især paa Rygfladen, at de ere tilstede i store Masser.

De store Spikler ere snart lige, snart ere de mere eller mindre krumbøjede og besatte med stærke Takker, Tab. II, Fig. 24; ikke saa sjeldent forgrene de sig, og da ere Grenene takkede, Tab. II, Fig. 23. De have en noget forskjellig Størrelse, i Almindelighed indtage de en Længde af 0,357^{mm} og en Tykkelse af 0,008^{mm}. Saavel de store, som smaa Spikler, findes i størst Mængde paa Ryggen, i Fødderne, Tab. II, Fig. 14, i Tentaklerne og Rygpapillerne, imedens de ere temmelig sparsomme paa Bugen.

I Mundskivens Hud findes, foruden de smaa Spikler, der her ere vinklede og tæt besatte med Takker, Tab. II, Fig. 20, dels rosetformige Kalklegemer, som bestaa af et Conglomerat af lancetdannede Kalkpapiller, Fig. 19, dels af Kalknet med forgrenede Udløbere, Fig. 21. Imellem disse Kalklegemer iagttages ogsaa et brunrødt Pigment, der dels er leiret i uregelmæssige Hobe, dels indesluttet i egne Celler.

I Fødderne ligge Spiklerne pakkede paatvers over hverandre og omgive ganske Foden, Fig. 14; det samme er Tilfældet med Tentaklerne og Rygpapillerne.

Fordøielsesorganerne.

Mundaabningen (Atriet) er stærkt muskuløs, og her danner Spiserørets Ringmuskler en stærk Sphincter.

Svælget er rundt, 4^{mm} langt, strækker sig omtr. 2^{mm} bagenfor Vandkarringen. Paa dets forreste Del og fra dets ydre Flade, der har et gulagtigt Udseende, løber én Mængde fine Muskeltraade, dels hen til Kalkringen, dels til Mundskiven. Svælget er en Fortsættelse af den ydre Hud, og har derfor væsentligen den samme anatomiske Bygning, som denne. Men ikke alene Svælget, hele Tarmkanalen har de samme Hudlag, og afvige kun forsaavidt, som de optræde med større eller mindre Styrke paa de forskjellige Steder.

Svælgets ydre Flade har et Peritonealovertræk, der flimrer; indenfor dette iagttages et smalt hyalint Bindevævslag, hvortil Muskellaget er bundet. Dette bestaar af Ring- og Længdemuskler, hvilke ere saaledes ordnede, at det faar et temmelig regelmæssigt gittret Udseende med Masker, der gaa paalangs.

Til Muskelhudens indre Flade fæster sig et bredt, hyalint, kjærnerigt Bindevævslag, hvorfra udgaa tætstaaende, og paa langs gaaende listeformige Fremspring. Umiddelbart indenfor dette Bindevævslag og bundet dertil, iagttages et Epithellag med en tyk Cuticula. De listeformige Frem-

on the ventral surface for instance, others crowded together in tufts or fasicles, fig. 11, fig. 10, fig. 22, and some regularly disposed in one or more spiniferous layers. It is more especially the dorsal surface which is densely covered with these spicules.

The large spiculæ are partly rectilinear, partly more or less incurved, and furnished with strong denticles; not infrequently they branch, the ramifications being in that case serrate, Pl. II, fig. 23. They vary somewhat as to magnitude, averaging, however, in length 0.357^{mm} and in thickness 0.008^{mm}. The large and the small spiculæ are both most numerous on the back, the suckers, Pl. II, fig. 14, the tentacles, and the dorsal papillæ, being rather sparingly distributed on the belly.

Throughout the integument investing the oral disk, exclusive of the spicules, which in this part of the skin are angular and closely denticulate, Pl. II, fig. 20, occur numbers of flosculous corpuscles, a conglomerate assemblage of lanceolate calcareous papillæ, fig. 19, together with calcareous reticulations, from which issue ramified appendices, fig. 21. Between these calcareous corpuscles is seen a brownish-red pigmentary substance, either irregularly distributed in patches or deposited in separate cells.

In the ambulacral suckers, the spiculæ are transversely arranged, one above the other, completely investing the sucker, fig. 14; a similar disposition is observed in the tentacles and the dorsal papillæ.

Digestive Organs.

The buccal orifice is exceedingly muscular, and at this point the annular muscles of the pharynx unite to form a powerful sphincter.

The pharynx, circular and 4^{mm} in length, protends about 2^{mm} posterior to the vascular ring. On the anterior portion of the pharynx, and issuing from its outer surface — of a yellowish appearance — are a number of delicate muscular filaments, part of which proceed to the calcareous ring, and part to the oral disk. The pharynx is a direct continuation of the outer integument, and hence its anatomical structure must be essentially similar. But the intestinal canal, no less than the pharynx, is invested with the same tegumentary layers, the only difference consisting in the greater or less degree of density, or compactness, it exhibits at different points.

Over the outer surface of the pharynx extends a peritoneal membrane, furnished with vibratile cilia, within which is seen a narrow layer of hyaline connective tissue, webbed to the muscular layer. The latter consists of annular and longitudinal muscles, their mode of arrangement giving to the surface a somewhat chequered appearance, with longitudinally extending tessellæ.

Webbed to the inner surface of the muscular membrane, is a broad layer of hyaline, highly nucleal connective tissue, from which proceed closely set, cornice-like longitudinal processes. Immediately beneath, and connate with, the layer of connective tissue, is seen an epithelial layer, furnished

spring med Epithelbeklædningen dannede stærke paalangs gaaende Folder, som findes paa Spiserørets indre Flade.

Epithelet bestaar af et Lag langstrakte Cylinderceller, der slutte tæt til hverandre ved Grunden, hvor de ere fæstede til Bindevævet. Disse Cylinderceller have en bred Basis og løbe noget tilspidsede henimod Cuticula. Enkelte af dem ere bredere og større end de andre og kunne svare til de Celler, Dr. Teuscher har anseet for Kjertler hos *Holothuria tubulosa*. Hvor Spiserøret gaar over i Mavesækken er en næsten umærkelig Indsnøring.

Maven er lidt kolbeformig, Tab. I, Fig. 8, *a*, omtrent 2,5mm lang, bredere fortil, smalere bagtil, hvor den gaar over i Tarmen. Den har en intens rødviolet Farve, er meget muskuløs, og synes i denne Henseende at overgaa Svælget. Dens indre Flade er foldet, men det er især paa den ventrale Del, at Folderne ere betydelig fremragende, og her er Epithellaget ogsaa tykkere, imedens Cuticula er smalere, end Tilfældet er i Svælget. Epithelet bestaar her af lignende Celler, som de, der ere beskrevne for Œsophagus, kun ere de især paa Ventralfladen noget længere, og have en smuk rød Farve, der hidrører fra deres pigmenterte Indhold. Om disse pigmenterte Celler, fornemmelig de store, fungere som Kjertler, skulle vi lade staa derhen, usandsynligt er det dog ikke; thi de ere jo noget forskjellige fra de øvrige Epithelceller. Idet Maven gaar over i Tarmen, er der en liden Indsnøring af denne, Fig. 8, *b*, som strax derpaa udvider sig og bliver temmelig tyk.

Tarmen har, som sædvanligt hos Holothuriderne, tre Bøjninger. Den første, nedadstigende Del, Fig. 8, *c*, ligger imellem begge Ryggens Længdemuskler, og gaar bag til Kloaken, derpaa slynger Tarmen sig til Venstre, gaar fortil og ligger nu i venstre Mellemrum paa Triviet, indtil den naar Maven, Fig. 8, *d*, hvor den bøjer sig over til højre Side, og løber saa bagtil i højre Trivium for at munde ud i Kloaken, Fig. 8, *e*. Tarmens Vægge ere tyndere end Mavens, kun henimod Kloaken antage de en tykkere Karakter, idet Muskelhuden har en rigere Muskulatur. Bindevævet er det samme hyaline, som tidligere omtalt, og paa Tarmens indre Ventralflade iagttages temmelig tætstaaende Længdefolder, der rage noget ind i Lumenet og ere egentlig Fortsættelser af Mavens Længdefolder. Den udvendige Flade har som sædvanligt et flimrende Peritonealovertræk.

Tarmkanalen er langs Bugfladen bunden til denne ved Mesenteriet, der bestaar væsentlig af Bindevævstraade, hvori enkelte Muskelfibre findes; men foruden dette Mesenterium er der ogsaa nogle meget lange muskuløse Traade, hvoraf

with a thick cuticle. The cornice-like processes form with the epithelial integument the prominent longitudinal folds that occur on the interior surface of the œsophagus.

The epithelium consists of a layer of elongate, cylindric cells, continuous at their bases, which are attached to the connective tissue. These cylindric cells have the base broad, becoming slightly acuminate towards the cuticle. Some of them are broader and larger than others, and correspond, it would seem, with the cells in *Holothuria tubulosa*, supposed by Dr. Teuscher to be glands. At the point where the œsophagus opens into the ventricle, occurs a scarcely appreciable instriction.

The stomach is slightly clavate, Pl. I, fig. 8, *a*; it measures 2.5mm in length, and is broader anteriorly than posteriorly at the entrance to the intestinal canal. In colour it is deep violet, with a vivid tinge of red. The stomach has very considerable muscular development, surpassing apparently in this respect the pharynx. Disposed over the inner surface, occur a series of folds, of which those on the ventral portion more especially are very prominent; and here, too, the epithelium is thicker, whereas the cuticle exhibits greater tenuity than is the case in the skin of the gullet. The epithelium consists here of cells similar to those — described above — in the œsophageal integument; they are, however, in particular on the ventral surface, somewhat greater in length, and of a fine bright-red colour, arising from their pigmentary contents. Whether these pigmentary cells, more especially the large ones, perform the function of glands, is a question we shall not attempt to decide; improbable, however, it certainly is not, differing as they do in some respects from the other epithelial cells. At the pyloric, or intestinal, opening, the stomach is slightly constricted, fig. 8, *b*; it immediately however expands, the walls attaining considerable thickness.

The intestine is triply convolute, a normal feature in the *Holothuriidæ*. The first, descending portion, fig. 8, *c*, extends down between the two dorsal longitudinal muscles, passing backwards to the anal aperture; the intestine then deflects sinistrously, protends forwards, and occupies the left segment of the trivium, till it reaches the stomach, fig. 8, *d*, where, after making a dextral bend, it projects backwards into the right segment of the trivium, to disembogue into the cloacum, fig. 8, *e*. The walls of the intestine are thinner than those of the stomach; not till they approach the anal opening is greater compactness apparent, the muscles in that part of the integument being more highly developed. The connective tissue is the hyaline membrane previously described. On the inner ventral surface of the intestine occur a number of rather closely disposed longitudinal folds, slightly projecting into the lumen — prolations from the longitudinal folds of the stomach. Over the outer surface extends the normal peritoneal membrane, furnished with vibratile cilia.

The intestinal canal is webbed to, and along, the ventral surface by the mesentery, which consists chiefly of filaments of connective tissue, along with a few muscular fibres; but, exclusive of this mesentery, there are a few ex-

enkelte kunne indtage næsten Dyrets hele Længde, idet de udspringe fra Ryggens forreste Dele og fæste sig paa Tarmens bagerste Ende. Fra Bugfladen gaa ogsaa nogle enkelte kortere Bindevævstraade hen til Tarmen. Hvor denne gaar over i Kloaken, danne Ringmusklerne en Sphincter.

Kloaken er oval langstrakt, Fig. 8, *f*, fra 8—10^{mm} lang, og har paa den forreste Del ved Siden af Tarmindgangen en tragtformig Forlængelse, der kan være indtil 5^{mm} lang, Fig. 8, *g*. Kloaken er bunden til Kropsvæggen ved en stor Mængde muskuløse Traade, Fig. 8, *h*, og dens vide Aabning er forsynet med en stærk Sphincter, der faar sine Muskler fra Hudens Tvermuskler. Kloaken dannes af de samme Lag som Tarmkanalen, kun ere saavel Muskulaturen som det hyaline Bindevæv meget stærkere repræsenteret. Dette sidste danner paa den indre Flade, hvortil Epithelet støder, fremspringende Længdelister, der bidrage til at forme de store Længdefolder, som findes paa Kloakens indre Flade. Imellem Længdefolderne sees mindre Folder, der gaa paatvers, hvorved et rudet Udseende fremkommer. Disse Tverfolder synes at være afhængige af Muskelvirksomheden i Kloaken, da de ere temmelig uregelmæssige.

I vor Beskrivelse over *Trochostoma Thomsoni*[1] gjorde vi opmærksom paa, at der i Tarmvæggene fandtes af og til en indkapslet Nematode, og at det fuldt udviklede Dyr hyppig var at træffe i Tarmindholdet. Noget lignende finder ogsaa Sted hos *Kolga hyalina*. I Tarmindholdet hos denne sees enkelte fuldt udviklede Individer af en Nematode, der er forskjellig fra den hos *Trochostoma Thomsoni*. Men foruden disse enkelte udviklede Dyr, findes der overalt i Kroppens Hud indkapslede Individer, der ligge spiralformig indesluttede i en tynd Membran. Disse saaledes indkapslede Orme ere dog saa spredte i den ydre Hud, at de ingen synderlig Forstyrrelse synes at frembringe der. Men ganske anderledes forholder det sig med Tarmen; her optræde de i større Mængde, ja hos enkelte Individer var der i Størstedelen af den første Slynge, lige fra Maven og henimod første Bøjning, en saa overordentlig Masse af disse indkapslede Nematoder, at Tarmens Muskelhud var saagodtsom ganske ødelagt. Tarmen var nemlig her særdeles meget udvidet, og dens Vægge vare yderst tynde og gjennemsigtige, næsten som et Flor. Den letteste Berørelse foraarsagede, at Tarmen løsnede fra Maven, og det kan ingen Tvivl være underkastet, at her var en pathologisk Tilstand indtraadt, der visselig ender med Individets Ødelæggelse. Ogsaa i Kloakens Vægge fandtes hos enkelte Exemplarer en Mængde indkapslede Nematoder, uden at vi kunde opdage andre Destruktioner, end at der, hvor Nematoden laa indspunden, var en Smule Muskelatrophi.

[1] Nyt Magazin for Naturv. 24. Bind, p. 238, Christiania 1878.

ceedingly long muscular filaments, most of which protend throughout the entire length almost of the animal, having their origin near the anterior extremity of the dorsal region, and terminating at the posterior extremity of the intestine, to which they are attached. A few shorter filaments of connective tissue proceed from the ventral surface to the intestine. At the point where the latter opens into the cloacum, a sphincter is formed by the annular muscles.

The cloacum is ovato-elongate, fig. 8, *f*, from 8^{mm} to 10^{mm} long, and furnished on the anterior margin, in immediate proximity to the outlet of the intestine, with a funnel-shaped appendage, attaining in some individuals a length of 5^{mm}, fig. 8, *g*. The cloacum is webbed to the inner surface of the trunk by large numbers of muscular filaments, fig. 8, *h*, and its wide opening provided with a powerful sphincter, composed of muscles branching off from the transverse muscles of the integument. The cloacum is built up of the same tegumentary layers as the intestinal canal, but the muscles and the hyaline connective tissue are much more developed. From the inner surface of the latter, adjoining the epithelium, issue a number of projecting longitudinal fillets, which contribute to the formation of the broad longitudinal folds on the inner surface of the cloacum. Between the broad longitudinal folds are seen numerous smaller ones, transversely disposed, which gives to the surface a tesselated appearance. These transverse folds would seem to depend on muscular action in the cloacum, being rather irregular in form and arrangement.

In our description of *Trochostoma Thomsoni*,[1] we called attention to the fact, that in the walls of the intestinal canal occurred now and again an incapsulated Nematoid, and that fully developed examples of that animal were frequently met with among the contents of the intestine. This, with some modification, is likewise characteristic of *Kolga hyalina*. Among the contents of the intestine are seen here and there fully developed examples of a Nematoid, differing however from that in *Trochostoma Thomsoni*. But, exclusive of these fully developed animals, incapsulated individuals, spirally coiled within a thin membrane, occur everywhere in the skin of the trunk. In the outer integument, these incapsulated vermicules are so sparingly dispersed that no serious organic derangement would seem to result from their presence. Not so, however, with the intestine; here, they occur in larger numbers; nay, in some of the individuals were found such enormous quantities of these incapsulated Nematoids throughout the greater part of the first convolution, from the pylorus to the first bend, that the muscular integument of the intestine had been well nigh worn away. The intestine was distended almost to bursting, its walls being thin and diaphanous as a piece of gauze. The slightest touch sufficed to detach the intestine from the stomach, and there can be no doubt whatever that a pathological phasis had set in which must inevitably have terminated in organic dissolution. In the walls of the cloacum, too, some examples had numbers of incap-

[1] Nyt Magazin for Naturv. Part 24, p. 238, Christiania 1878.

Det indre Skelet.

Kalkringen er temmelig rudimentær, ligner vistnok meget Kalkringen hos *Elpidia* og *Irpa*; men er baade langt smekkrere og ikke saa inderlig sammenbunden, som hos disse. Den dannes af 5 Stykker, Tab. III, fig. 27, der nærmest maa svare til Radialstykkerne hos andre Holothurider. Ethvert Stykke, der er omtr. 1,5^{mm} langt, har et næsten firkantet Midtparti, Fig. 28, *a*, som er 0,068^{mm} bredt og ikke fuldt saa højt. Dette Midtparti er ligesom delt i to Dele, en forreste, der er smalest, og en bagerste. Fra den forreste Del udgaa 6 Stave, hvoraf de to hæve sig skraa fortil og opad imod Spiserøret, og ende svagt kølleformigt, Fig. 28, *b, b*; de øvrige 4, der hver deler sig et Stykke ovenfor Udspringet i to Grene, Fig. 28, *c, c*, hæve sig bagtil og opad, og synes at følge Tentakelkarrene. Fra Midtpartiets bagerste Del udgaa paa hver Side 4 lange Stave, Fig. 28, *d, d, d, d*, der ligesom straale ud til Siderne, og hvoraf den længste løber noget paaskraa henimod Enden af den tilsvarende Stav paa det nærmest tilgrændsende Kalkstykke, Fig. 27, *a, a*. Enderne af disse Stave ere bladformige, og forsynede med Indsnit og Huller, Fig. 28. De her nævnte Kalkstave fra Midtpartiets bagerste Del ere smalere ved deres Udspring; paa Midten ere de 0,013^{mm} tykke, og Enderne ere indtil 0,040^{mm} brede. De saaledes beskrevne 5 Kalkstykker ere yderst fine, og kunne vanskeligen opdages med det blotte Øje. Naar de ere i Situs, danne de en femkantet Ring, idet de bagerste, fornemmelig de længste Stave, naa saa langt til hverandre, at Ringen derved afsluttes. Kalkstavene ligge ikke paa hinanden, saaledes som Tilfældet er hos *Elpidia* og *Irpa*; men deres Ender ere bundne sammen med Bindevæv, ligesom hele Kalkringen ligger fæstet i den Bindevævshud, der danner Svælgsinus. Kalkringen ligger en god Del foran Vandkarringen; og Midtpartiet af ethvert af dens Stykker findes just der, hvor de 5 Hovedstammer dele sig for at afgive Grene til Tentaklerne, Tab. I, fig. 9, *a, a*. Paa Kalkringens Stave fæster sig dels Muskelbaand, dels Bindevævstraade, der udgaa fra Svælget og fra Mundskiven. Til nogen synderlig Støtte for Noget kan visselig ikke Kalkringen tjene, da den er saa yderst fint bygget.

Vandkarsystemet.

Ringkanalen er dækket af den Bindevævsmembran, der danner Svælgsinus. Denne Membran, der er temmelig tyk, er fastvoxet til den bagerste Del af Ringkanalens ind-

sulated Nematoids; we failed, however, to detect any organic disturbance, saving traces of muscular atrophy where the Nematoids lay embedded.

Calcareous Skeleton.

The calcareous ring is imperfectly developed, indeed almost rudimentary; true, it presents considerable resemblance to the calcareous ring in *Elpidia* and *Irpa*, but is of far more slender dimensions, and less compactly put together. It consists of 5 calcareous segments, Pl. III, fig. 27, corresponding to the radial plates in other Holothurians. Each of these segments, measuring about 1.5^{mm} in length, has an almost quadrate central section, fig. 28, *a*, 0.068^{mm} broad, and not quite so deep. This central section is, as it were, bipartite, the anterior part being the narrower. Affixed to the anterior part are 6 calcareous rods, two of which protend obliquely forwards in the direction of the œsophagus, with a slightly claviform extremity, fig. 28, *b, b*; the remaining 4, each of which branches out a little above the point of origin, with two ramifications, fig. 28, *c, c*, and protends posteriorly upwards, apparently protending along the tentacular vessels. To the posterior part of the central section are affixed on either side 4 long calcareous rods, fig. 28, *d, d, d, d*, radiating, as it were, to the sides, the longest of which protends somewhat obliquely towards the extremity of the corresponding rod on the calcareous segment next adjacent, fig. 27, *a, a*. These rods have petaloid extremities, furnished with apertures and incisions, fig. 28. The rods springing from the posterior part of the central section, are slenderest at their origin; in the middle, they measure 0.013^{mm} in thickness, having a breadth of 0.040^{mm} at the extremities. The 5 calcareous segments described above are exceedingly minute, and can with difficulty be discerned with the naked eye. When in *situ*, they present the appearance of a pentagonal ring, the posterior rods, and in particular the longest of them approximating sufficiently to close the ring. The calcareous rods do not lie one above the other, as in *Elpidia* and *Irpa*, but their extremities are webbed together by connective tissue, and the ring itself lies wholly embedded in the membrane of connective tissue forming the pharyngeal sinus. The calcareous ring is placed considerably in advance of the water-vascular ring; and the central section of each of its segments is located exactly where the 5 principal stems ramify to the tentacles, Pl I, fig. 9, *a, a*. The rods of the calcareous ring are pinnated with muscular bands and filaments of connective tissue, proceeding from the gullet and from the buccal disk. From the extreme fragility of its structure, the calcareous ring can hardly be of much importance as a means of strengthening any part of the organism.

Aquiferous System.

The annular canal is enveloped by the membrane of connective tissue constituting the pharyngeal sinus. This membrane, which is rather compact, is connate with the posterior

vendige Flade, og fortsætter sit Løb fortil, hvor den udbreder sig tragtformig over Tentakelkarrene for at fæste sig paa Mundskiven, Tab. I, Fig. 8, *u*. Den maa ganske separeres bort, for at Vandkarringen med dens Kar kan komme tilsyne, hvilket har sine særdeles store Vanskeligheder.

Vandkarringen er rund og omslutter Spiserøret, hvortil den er nøie bunden ved Bindevæv, Fig. 9, *b*. Dens nøie Forbindelse med Svælget gjør, at Svælgsinus er ganske afsluttet og korresponderer ikke med Kropshulheden. Vandkarringen er omtrent 2^{mm} bred, *maaske* noget bredere, naar den er udspændt, og fra dens forreste Del udgaa 5 Hovedstammer, Fig. 9, *c, c*, der ere brede ved Udspringet, men smalnes snart af, indtil de omtrent 1^{mm} fra Ringen, hvor de dele sig, indtage 1^{mm} Tykkelse, Fig. 9, *d*. Dette er dog noget forskjelligt; saaledes ere de to Sidekar noget tykkere. Af de 5 Kar tilhøre 2 Biviet og 3 Triviet. De to Rygkar dele sig hver i 2 Grene, der gaa til hver sin Tentakel. Af Bugkarrene deler det midterste sig i to Grene, Fig. 9, *d*, der gaa til hver sin Tentakel, imedens de to Sidegrene dele sig hver i 3 Grene, Fig. 9, *e, e*, af hvilke den ene danner Længdekarret og de to øvrige gaa til hver sin Tentakel. Der er altsaa 10 Tentakelkar og 2 Længdekar. Længdekarret gaar foran Midtpartiet af Kalkringens enkelte Stykker henimod Mundskiven, løber saa hen til Længdemuskelens Insertionspunkt, hvor det i Muskelens gaffelformige Deling gaar bagtil, dækket af Muskelen, liggende imellem denne og Radialnerven. Naar Længdekarret er kommet hen til den første Fod, afgiver det en Gren til denne, der ender blindt. Ved Fodens Grund ligger en aflang Ampulle, der er bredere ved Udspringet, smalere indad og er fæstet til Hudens indre Flade, dels ved Bindevæv, dels ved Muskelbaand, Fig. 2, *d*, 26, *b*. Ampullens udvendige Væg ligger i umiddelbar Berørelse med Huden, imedens den, der vender mod Kropshulheden (altsaa den indre) er beklædt af Peritoneum. Den er dannet af et hyalint Bindevævslag og af en Muskelhud, som bestaar af stærke Ring- og Længdemuskler. Hvor Ampullen er fæstet til Huden, ser det ud, som om den var nedsænket i denne, men saa er ikke Tilfældet. Hudens Tvermuskler ere vegne fra hverandre for at give Plads for Ampullen, og derved bliver Grændsen, som dannes af de fra hverandre drevne Tvermuskler, noget ophøiet.

Det er jo et ganske særegent Forhold, men staar dog ikke ganske isoleret; thi hos *Elpidia* træffer man paa noget lignende. Enhver Fod er forsynet med en saadan Ampulle, der dog aftager noget i Størrelse paa den bagre Kropsende, hvor de tillige have en mere skraa Stilling, Fig. 2. Vandkarringen, tilligemed de fra den udgaaende Kar, er dannet af de samme Lag, som ere egne for disse Organer hos Holothuriderne i Almindelighed; men

portion of the inner surface of the annular canal; from thence it continues its forward course, and, after expanding funnel-wise to enclose the tentacular vessels, is webbed to the oral disk, Pl. I, fig. 8, *u*. It must be wholly detached ere the water-vascular ring, with its vessels, can be discerned, a matter of very considerable difficulty.

The water-vascular ring, which is round, encircles the œsophagus, both organs being webbed together by connective tissue, fig. 9, *b*. Hence, the pharyngeal sinus, by reason of this close connexion, is completely isolated, and does not correspond with the perivisceral cavity. The water-vascular ring is about 2^{mm} in diameter, *possibly* a trifle more when fully expanded, and from its anterior part protend 5 principal stems, fig. 9, *c, c*, which are broad at the base, or origin, but rapidly narrow, till their thickness about 1^{mm} from the margin of the ring, where they branch off, does not exceed 1^{mm}, fig. 9, *d*. This, however, is not always the case; the two lateral vessels, for instance, are somewhat thicker. Of the 5 vessels, 2 belong to the bivium, and 3 to the trivium. The 2 dorsal vessels are bifurcate, the branches protending each to a tentacle. Of the ventral vessels, that in the middle is bifurcate, fig. 9, *d*, the two branches protending each to a tentacle, whereas the two lateral vessels are trifurcate, fig. 9, *e, e*, one of the branches forming the longitudinal vessel, and the remaining two protending each to a tentacle. Hence there are 10 tentacular vessels and 2 longitudinal vessels. The longitudinal vessel passes in front of the central section of the segments of the calcareous ring to the oral disk, where it bends backwards in the furcated division of the muscle, covered by the muscle extending between the latter and the radial nerve. On reaching the first sucker, the longitudinal vessel furnishes it with a branch, terminating cæcally. At the base of the sucker is seen an oblong ampulla, rather broad at its origin and narrower within, which is attached to the inner surface of the integument, partly by connective tissue and partly by muscular bands, figs. 2, *d*; 26, *b*. The exterior wall of the ampulla is in contact with the skin, whereas that facing the perivisceral cavity (the interior) is covered by the peritoneum. It consists of a layer of hyaline connective tissue, and of a muscular integument, the latter composed of powerful circular and longitudinal muscles. At the point of attachment, the ampulla appears embedded in the skin; but such is not the case: the transverse muscles of the integument diverge to make way for the ampulla, and hence there is a slight elevation of the skin along the boundary-line, resulting from a divergence of the transverse muscles.

This is certainly a very peculiar feature, though not altogether unique, something analogous being met with in the genus *Elpidia*. Every sucker, or foot, is furnished with one of these ampullæ, which slightly diminish in magnitude on the posterior extremity of the body, their position, too, being there more oblique, fig. 2. The water-vascular ring, and the vessels proceeding from it, are composed of the same tegumentary layers that generally constitute those

Bindevævet er dog overalt hyalint og rigt paa Kjærner.

Fødderne have den samme anatomiske Bygning, som Huden, kun med den Forskjel, at i deres Hulhed ender en Gren af Radialkarret blindt. Kalkspiklerne i Fødderne ere to Slags, de smaa og de store, hvilke tidligere ere beskrevne; de store ere dog tilstede i størst Mængde, ligge baade paatvers og paaskraa, dog saaledes, at de paatvers liggende ligesom omgive Foden og ere mere sammenpakkede end de skraa, der ligge mere isolerede. Imod Fodspidsen blive Kalkspiklerne mindre og spinklere, og ere her tildels sammenflettede, uden dog at danne noget Net, Fig. 14.

Tentaklerne ere i det væsentlige bygget som Fødderne, kun er deres Form meget forskjellig. Skaftet er cylindrisk, glat og sparsomt forsynet med Kalk, og kun hist og her sees en Spikel; paa Bladet, der er meget tykt, er det Fligene og fornemmelig deres Rande, som have en bred Bræm af tætbesatte Spikler. Paa de tre store Lapper er den midterste Flig næsten ganske indtaget af Spikler. Overalt i Tentakelfligene findes afsat i Bindevævet dels under, dels imellem Spikellaget en stor Mængde orangefarvet Pigment, der ligesom i Mundskivens Hud er snart samlet i Hobe, snart indesluttet i spredte Celler.

Vandkarringen har som sædvanligt sine to Tilhæng, nemlig den Poliske Blære og Stenkanalen. Den Poliske Blære er meget stor, har en kort, men bred Hals, hvormed den munder ud noget til Siden paa Ringkanalens Bugflade, Fig. 8, *e*, 9, *f*. Dens Vægge ere temmelig tykke og have samme anatomisk-histologiske Bygning, som Ringkanalen; dog synes dens Muskulatur at være stærkere.

Stenkanalen, der er temmelig lang, næsten melkehvid, ikke meget tyk, men fast, snor sig korketrækkerformigt langs Udførselsgangen for Kjønsorganet, hvortil den er bunden ved et løst Bindevæv, Fig. 8, *i*, 29, *a*. Dens ydre Ende, Fig. 8, *k*, 29, *b*, perforerer Huden omtrent paa Midten af Halsen strax foran Kraven, hvor den udmunder paa Hudens Overflade med en fin, rund Aabning, der er tæt omgivet af større og mindre Spikler, Fig. 29, *c*. Dens indre Ende munder ud som sædvanligt i Ringkanalen paa Rygsiden, dog henimod dennes Sidedel. Stenkanalen dannes af et tykt, hyalint Bindevævslag, og dens Lumen er beklædt med flere Cellelag, hvoraf det inderste bestaar af lange, flimrende Cylinderceller. Dette indre Epithel synes næsten ganske at udfylde Hulheden. Kalk findes ikke i Stenkanalen.

Her har man da en fuldstændig embryonal Tilstand, forsaavidt Stenkanalen er forbleven aaben, hvorved Vandkarringens Indhold umiddelbart korresponderer med Søvandet.

organs in the *Holothuriidæ;* but the connective tissue is everywhere hyaline, and highly nuclean.

The suckers are distinguished by the same anatomical structure as the skin, saving that a branch of the radial vessel terminates cæcally in their cavities. As already described, the calcareous spiculæ in the suckers are of two kinds — small and large; the large spiculæ, which occur in the greatest numbers, exhibit some a transverse and some an oblique arrangement, those transversely disposed apparently circumscribing the sucker; moreover, they are closer set than the oblique spiculæ, the latter being comparatively isolated. Near the extremity of the sucker, the calcareous spiculæ are smaller and more slender; here, too, they are partly interlaced, without however being strictly reticular, fig. 14.

The structure of the tentacles is essentially similar to that of the suckers, their form, however, widely different. The tentacular shaft is cylindric, smooth, and sparingly furnished with calcareous deposit; and here and there only does an isolated spicule occur; the lobes of the pinnæ, and more especially their margins, are densely covered with spiculæ. On the three large lobes, the medial lobule is almost wholly occupied by spiculæ. Throughout the connective tissue of the tentacular lobules, partly beneath, partly between the spicular layer, is seen a mass of orange-coloured pigment, occurring, as in the membrane of the oral disk, either agglomerated in patches or deposited in cells.

The water-vascular ring has the two normal appendages, viz. the Polian vesicle and the sand-canal. The Polian vesicle is very large, and furnished with a short, but broad neck, through which, slightly deflected, it disembogues on the ventral surface of the annular canal, fig. 8, *e*; 9, *f*. The walls of the vesicle are rather thick, their anatomic-histological structure being that of the annular canal; its muscular development is however apparently greater.

The sand-canal, which is rather long, in colour approaching to milky-white, not particularly thick, but firm in texture, winds in a spiral coil along the eferent duct of the generative organ, to which it is webbed by lax connective tissue, fig. 8, *i*; 29, *a*. Its outer extremity, fig. 8, *k*; 29, *b*, perforates the skin nearly in the middle of the neck, immediately in front of the "collar," at which point it disembogues on the surface of the integument, through a narrow, circular opening, densely bordered with larger and smaller spiculæ, fig. 29, *c*. Its inner extremity, as is commonly the case, opens into the vascular ring on the dorsal side, but somewhat laterally. The sand-canal is composed of diaphanous connective tissue, and has its lumen covered with cellular layers, the innermost layer consisting of long cylindric cells, furnished with vibratile cilia. The cavity would seem to be almost entirely filled up by this inner epithelium. No traces of calcareous deposit in the sand-canal.

Here, accordingly, we have a true embryonic state, inasmuch as the sand-canal still remains open, whereby the water-vascular ring and its contents are kept in direct communication with the sea-water.

Under Beskrivelsen af Slægterne *Trochostoma* og *Irpa* gjorde vi opmærksom paa, at Stenkanalen var fastvoxet til Huden, uden at gjennembore den, og at der havde dannet sig en Madreporplade paa selve Stenkanalen, indenfor Tilhæftningspunktet, og vi antydede, at denne Ordning mindede om en embryonal Tilstand. Hos *Elpidia* er Stenkanalen ligeledes fastvoxen til den ydre Hud; men hos den har ingen Madreporplade dannet sig, hvorved den end mere end de to nævnte Slægter nærmer sig Larvestadiet, som først hos *Kolga* er fuldkommen vedligeholdt.

Ihvorvel den paa Ryggen beskrevne Krave med de 6 Papiller ikke staar i nogen direkte Forbindelse med Vandkarsystemet, saa maa de dog nærmest henføres dertil, da de svare til Holothuridernes Rygfødder.

Paa den indre Flade af Kropshuden, paa det Sted, der svarer til Kraven, findes et Hulrum, der er dækket af et Diaphragma, hvori sees 4 aflange Aabninger, to til hver Side, Fig. 8, *l,* 12, *h.* Diaphragmaet er dannet af et temmelig fast, hyalint Bindevævslag, samt Muskelfibre, og har et Overtræk af det flimrende Peritoneum. Aabningerne ere forsynede med cirkulære Muskelfibre, der danne en Slags Sphincter, som bidrager til, at de kunne sammentrækkes og udvides efter Omstændighederne. Borttager man Diaphragmaet, iagttages en aflang Hulhed, der svarer til Kravens Form, og i hvis Bund sees 6 runde Aabninger for de hule Papiller. Saavel Hulrummet, som Hulheden i Papillerne ere beklædte med et flimrende Epithel, der er Fortsættelse af Peritoneums. Kravens Hulhed, ligesom Papillernes, staa saaledes i umiddelbar Forbindelse med Kropshulheden, og dennes Vædske cirkulerer derfor ind og ud af dem og bidrager til, at de udspændes og sammenfalder. Selve Papillernes Struktur er den samme som Føddernes, kun ligge Spiklerne noget mere adskilte fra hverandre, naar undtages de øverste Spidser, hvor de ligge mere compakte.

When describing the genera *Trochostoma* and *Irpa,* we called attention to the fact that the sand-canal was connate with the integument, which, however, it does not perforate, and that a madreporic plate had developed on the canal itself, within the point of attachment, intimating that such organic arrangement was suggestive of an embryonic state. In *Elpidia,* too, the sand-canal is connate with the outer skin; but there is no madreporic plate, and hence it approximates more closely than do either of those genera to the larval stage, which in *Kolga* is perfectly maintained.

The dorsal protuberance, or collar, with its 6 papillary warts, has, indeed, no direct connexion with the aquiferous system, but must nevertheless be referred to that part of the organism, being the analogue of the dorsal suckers in other Holothurians.

On the inner surface of the integument, in juxtaposition to the base of the collar, occurs a hollow space, covered by a diaphragm, in which are seen 4 oblong openings, two on either side, fig. 8, *l;* 12, *h.* The diaphragm consists of a layer of rather firm, hyaline connective tissue, and of muscular fibres, over which extends the ciliated peritoneum. The openings are furnished with circular muscular fibres, constituting, as it were, sphincters, that assist, when needful, in their contraction and expansion. On removing the diaphragm, an oblong excavation is observed, similar in form to the collar, and in the bottom of which are seen 6 round apertures, for the reception of the hollow papillæ. This hollow space, and the cavities of the papillæ, are both covered with a ciliated epithelial membrane, a continuation of that on the peritoneum. Hence, the hollow interior alike of the collar and of the papillæ is in direct communication with the perivisceral cavity, affording ingress and egress to its fluid, which, circulating freely through them, is partly the cause of their expansion and collapse. The papillæ have the same structure as the suckers; their spiculæ, however, are less closely set, saving those on the extreme points, where a denser arrangement is observed.

Blodkarsystemet.

De Blodkar, som strax springe i Øinene, naar Dyret aabnes, er Tarmens Ryg- og Bugkar, eftersom Sectionen sker fra Ryg- eller Bugsiden. Disse Kar udspringe jo hos Holothuriderne i Almindelighed paa Grændsen imellem Mave og Tarm; men saa er ikke Tilfældet hos *Kolga.* Her tage de sit Udspring fra et ringformigt Kar, der omgiver Svælget, Fig. 8, *m,* strax bagenfor Vandkarringen og tildels dækket af denne.

Blodkarringen, der er fin som en Traad, afgiver fra dens forreste Rand Grene til Svælget og et Par Grene til Vandkarringen; fra dens bagerste Rand udgaar en Gren, der bugter sig langs Spiserøret og Maven til Kjønsorga-

Circulatory System.

On opening the animal, the blood-vessels first discerned are the dorsal and ventral vessels of the intestine, according as the section be made on the dorsal or ventral side. Now, these vessels originate in most Holothurians between the stomach and the intestine; but *Kolga* forms an exception to the general rule. In this genus, they issue from an annular vessel encircling the gullet, fig. 8, *m,* immediately posterior to the water-vascular ring of the ambulacral system, by which they are partly covered.

The circlet of blood-vessels, which is slender as a fine-drawn wire, ramifies on the anterior margin, divers branches protending to the gullet, and one or two to the water-vascular ring; from the posterior margin a flexuous

net, paa hvilket den udbreder sig; desforuden udgaar fra denne bagerste Rand Ryg- og Bugkarret.

Rygkarret, Fig. 8, *n*, er i sit Udspring meget tyndt, løber langs Oesophagus og Maven bag til Tarmens Begyndelse, hvor det bliver noget tykkere, og fortsætter nu sit Løb paa Tarmens Rygflade, indtil det naar den nederste Del af den sidste Slynge, hvor det bliver tyndere og taber sig i Kloaken, Fig. 8, *o*, *o*. Paa denne Vei afgiver det flere Grene til Mave og Mesenteriet, ligesom Tarmens Vægge blive rigelig forsynede med Tvergrene, der som sædvanligt anastomosere med de tilsvarende Grene fra Bugkarret og danne netformige Udbredninger. Rygkarret er ved Bindevæv fast bundet til Mave- og Tarmvæggen.

Bugkarret er bredere end Rygkarret, og har samme Løb som dette, kun ender det noget længere fortil paa sidste Tarmslynge. Det afgiver ligeledes Grene til Mave og Tarm, og sender fra den ene Tarmslynge over til den anden flere Grene, hvoraf enkelte anastomosere med hinanden, Fig. 8, *p*. Det ovenfor beskrevne cirkulære Blodkar, der omgiver Spiserøret, svarer nogenledes til det Kar, Dr. Thêel i sin Afhandling over *Elpidia* kalder Centralkar og betragter som Hjerte. Hos *Kolga* dannes Centralringen af et afsluttet Kar med tykkere, fastere og mere muskuløse Vægge, end samtlige de Kar, der udspringe fra det, saa det tør hænde, at det virker som et Hjerte.

Nervesystemet.

Nerveringen er som hos alle Holothurider placeret lige bag Mundskiven, hvortil den er fæstet ved Bindevæv, og omgiver Spiserøret. Den er bred, noget bugtet eller knudet og har et gulagtigt Udseende, Fig. 30. Den afgiver mindre Grene til Mundskiven, Svælget og Tentaklerne, Fig. 30, *a*, *a*, *a*, *a*; men desforuden udgaa 5 store Stammer fra den, nemlig Radialnerverne, Fig. 30, *b*, *b*, *b*, *b*, *b*. Af disse tilhøre 3 Triviet og 2 Biviet.

Radialnerverne ere bredere ved deres Udspring, der i Regelen findes ved Siden af en Knude eller Udbugtning, Fig. 30, *c*; men blive snart smalere, indtil de naa Mundskivens ydre Rand, hvor de tiltage noget i Tykkelse, idet de træde dels imellem Længdemuskelen og Huden, dels imellem denne og Længdekarret, for at gaa bag mod Enden af Kroppen. Bredest ere de dog paa Kroppens Midtparti. Imedens de løbe bag Mundskiven, afgive de flere Grene til denne, i hvis Hud disse udbrede sig. De to Radial-Rygnerver give hver to Grene, en til hver af de to store

branch winds along the œsophagus and the stomach to the generative organ, over which it expands; from the posterior margin issue, too, the dorsal and the ventral vessels.

The dorsal vessel, fig. 8, *n*, is exceedingly thin at its origin; it passes backwards along the œsophagus and the stomach to the superior extremity of the intestine, where a slight dilatation is observed, running from thence over the dorsal surface of the intestine, till it reaches the extremity of the terminal convolution, to disappear in the cloacum, fig. 8, *o*, *o*. On its course thither it branches off to the stomach and the mesentery; the walls of the intestine are furnished with numerous transverse ramifications, which, as is commonly the case, anastomose with the branches from the ventral vessel, terminating in reticulated expansions. The dorsal vessel is webbed to the walls of the stomach and intestine by connective tissue.

The ventral vessel is broader than the dorsal; it extends in the same direction as the latter, but terminates a little farther in advance, on the last convolution of the intestine. This vessel, too, sends off branches to the stomach and the intestine, and divers ramifications extend from one intestinal convolution to the other, some of which anastomose one with the other, fig. 8, *p*. The annular blood-vessel, described above, encircling the œsophagus, corresponds in some measure to the vessel which Dr. Théel, in his treatise on the genus *Elpidia*, terms the central vessel, performing, as he conceives, the functions of a heart. In *Kolga*, the central ring is a closed vessel, having thicker, stronger, and more muscular walls than have any of the vessels proceeding from it; and hence, possibly, its action may be regarded as that of a heart.

Nervous System.

As in all Holothurians, the nervous ring occupies the space immediately posterior to the oral disk, with which it is connected by a web of connective tissue, and encircles the œsophagus. It is broad, slightly moniliform, and of a yellowish appearance, fig. 30. It furnishes slender ramifications to the oral disk, the gullet, and the tentacles, fig. 30, *a*, *a*, exclusive of which 5 large stems are seen to issue from it, viz. the radial nerves, fig. 30, *b*, *b*, *b*, *b*, *b*. Of these, 2 belong to the bivium, and 3 to the trivium.

The radial nerves are thicker at the point of origin, which as a rule is contiguous to a nodular expansion, fig. 30, *c*, but rapidly assume a slenderer form, which is preserved till they reach the exterior margin of the oral disk, where a slight dilatation becomes apparent, as they pass partly between the longitudinal muscle and the skin, and partly between the latter and the longitudinal vessel, protending backwards to the terminal extremity of the trunk. These nerves, however, attain their greatest thickness in the medial portion of the trunk.

Blærer, der indeslutte Otolither, hvilke ligge, en paa hver Side af Nerven, netop paa det Sted, hvor Radialmuskelen insererer sig, førend Nerven skjules af denne, Fig. 30, *d, e, f.* Hvor de to Rygnerver ligge imellem Længdemusklerne og Huden, afgive de en Mængde temmelig tykke Grene ikke alene til Muskellaget, men ogsaa til Huden, hvori de forgrene sig, Fig. 31, anastomosere med hverandre og ende i Epithellagets Celler, Fig. 32. Foruden disse Hud- og Muskelgrene sende de ogsaa dels 1, dels 2 Grene til hver Rygpapille, i hvis Hud de udbrede sig.

Den midterste Radialnerve paa Bugfladen løber imellem Længdemuskelen og Huden og afgiver Grene til begge, dog synes Nerveforgreningerne langtfra at være saa rige paa Bugen, som paa Ryggen.

De to Side-Radialnerver løbe, idet de forlade Mundskiven, bagtil imellem Radialkarret og Huden. Enhver af dem afgiver, lidt bagenfor Længdemusklernes Insertion, 1 Gren til den første Høreblære, der ligger omtrent midt paa Nervestammen, Fig. 30, *g, g,* og fra nu af, og indtil den naar den første Fod, sender den 5 Grene til 5 efter hinanden liggende Høreblærer. Til første Fod afgiver den en temmelig tyk Gren, ligesom til en Høreblære, der ligger ved Foden. I det Rum, som findes imellem 1ste og 2den Fod, 2den og 3die, 3die og 4de, 4de og 5te, 5te og 6te, er der to Høreblærer, Fig. 26, *c, c,* i Rummet mellem de øvrige Fødder er der kun en Blære. Enhver af disse Blærer forsynes med en Nervegren, og desforuden er der ved Grunden af hver Fod en Blære, der ligeledes faar sin Nerve fra Radialstammen, Fig. 26, *d;* ialt er der altsaa paa hver Side 26 Høreblærer. Radialstammen afgiver fremdeles Grene til Sidepartiets Hud og til Musklerne.

De nævnte Høreblærer ere runde, Fig. 33, *a, a,* noget forskjellige i Størrelse; størst ere de to Par, som findes paa Ryggen, omtr. 0.25^{mm}, og mindst ere de, som findes paa den forreste og bagerste Ende af Kroppen, omtrent 0.06—0.08^{mm}. Paa Midten af denne ere de fra 0.16—0.19^{mm}. De dannes af en temmelig fast, hyalin Bindevævsmembran, Fig. 34, *a,* der stilkformig forlænger sig hen til Nervestammen, idet den omfatter Nervegrenen, som gaar til Blæren. Den indvendige Flade af Blæren er beklædt med et Epithellag, Fig. 34, *b.* Imellem dette udbreder Nerven sig. Enhver Blære indeholder en Mængde, dels aflange, dels runde Otolither, fra 20—130, Fig. 33, *a,* 34, *c.* De runde ere sammensatte af concentriske Ringe, Tab. II, Fig. 17; de aflange dannes af Lag, der ligge paa hinanden, og hvoraf det yderste er det korteste, Fig. 18, *a.* Paa den ene Ende af disse Otolither sees hyppigt en liden rundagtig Fremstaaenhed, Fig. 18, *b.*

On passing behind the oral disk, they furnish that organ with several offshoots, which ramify in its integument. The two radial dorsal nerves branch dichotomously, both furnishing an offshoot to each of the large vesicles, enclosing Otoliths, placed one on either side of the nerve, at the exact point where the radial muscle issues, previous to its concealing the nerve, fig. 30, *d, e, f.* The two dorsal nerves, where they extend between the longitudinal muscles and the skin, furnish a number of rather thickish branches not only to the muscular layer, but also to the integument, in which they ramify, fig. 31, anastomosing one with the other, and terminating in the cells of the epithelium, fig. 32. Exclusive of these tegumentary and muscular offshoots, ramifications proceed to each dorsal papilla, sometimes 1, sometimes 2, in the skin of which they spread.

The medial radial nerve on the surface of the belly extends between the longitudinal muscle and the integument, furnishing both with branches; the nervous ramifications, however, would appear to be far less numerous on the ventral than on the dorsal surface.

The two lateral radial nerves take a backward course from the oral disk, between the radial vessel and the skin. A little posterior to the point of insertion of the longitudinal muscles, each of these nerves furnishes a branch to the first auditory vesicle, placed about midway on the nervous trunk, fig. 30, *g, g;* from this point to the first sucker, it sends forth 5 separate offshoots to as many successively disposed auditory vesicles. The first sucker, and an auditory vesicle at its base, are furnished each with a thickish branch. In the spaces intervening between the first and second, the second and third, the third and fourth, the fourth and fifth, and the fifth and sixth, occur two auditory vesicles, fig. 26, *c, c;* in the spaces between the remaining pairs of suckers, only one. Each of these vesicles is provided with a nervous branchlet; and at the base of every sucker occurs a vesicle, whose nerve proceeds from the radial trunk, fig. 26, *d;* each side has accordingly, in all, 26 auditory vesicles. Moreover, the radial trunk also furnishes the lateral portion of the integument and the muscles with branches.

The auditory vesicles, which are globular in form, fig 33, *a, a,* vary somewhat in magnitude; the largest, are the two pairs on the back, measuring about 0.25^{mm}, the smallest, those at the anterior and posterior extremities of the trunk, which measure 0.06^{mm}—0.08^{mm}. In the medial region they are from 0.16^{mm} to 0.19^{mm} in diameter. They consist of a comparatively firm, hyaline membrane of connective tissue, fig. 34, *a,* which extends as a pedunculate appendage to the nervous trunk, enclosing the nervous branch that goes to the vesicle. The inner surface of the vesicle is covered by an epithelian layer, fig. 34, *b.* Throughout the latter the nerve spreads. Every vesicle contains a number (20—130) of Otoliths, part oval and part circular, figs. 33, *a;* 34, *c.* The round Otoliths are built up of concentric rings, the oval of divers calcareous layers, lying one upon the other, the outermost layer being the shortest, fig. 18, *a.* At one extremity of these Otoliths, is frequently seen a small roundish prominence, fig. 18, *b.*

I histologisk Henseende er Nervesystemet hos *Kolga* ikke væsentlig forskjelligt fra det hidtil kjendte hos Holothuriderne. Radialnerven, Tab. I, Fig. 10, *h*, er indesluttet i et Kar, der er sammenvoxet til Nervens ydre Side, Fig. 10, *i*, imedens det er aabent paa den indre, Fig. 10, *k*, og her sees Karret at være beklædt med et Epithel. Imellem den ikke sammenvoxede Del (den indre Halvdel) af Karret og Længdemuskelen eller Længdekarret, er en Bindevævsliste, Fig. 10, *l*, som tjener til Beskyttelse under Muskelkontraktionerne. Selve Nervestammen bestaar af en fin fibrillær Masse, der ligesom dannes af 2 Lag, et lysere, bredere, der er det yderste, Fig. 10, *m*, og et mørkere, tættere, men lidt smalere, der er det indre og vender mod det aabne Kar, Fig. 10, *n*. Noget Bindevævsseptum, der adskiller disse Lag, findes ikke, saaledes som Tilfældet er f. Ex. hos *Holothuria tubulosa* efter Teuschers Angivelse. Celler, egne for Nerven (Nerveceller), have vi ikke iagttaget. Ét Tversnit af Radialnerven frembyder altid et kornet Udseende. Nerveringen synes ikke at være indesluttet i noget Kar, — er dette Tilfældet, maa Karret være nøie sammenvoxet med selve Nervemassen, der har den samme Struktur, som Radialnerverne.

Kjønsorganerne.

Kjønnet er adskilt, ligesom hos Slægterne *Elpidia* og *Irpa*. Kjønsorganerne ere ved et meget kort, fast Ligament bundne til det dorsale Mesenterium paa det Sted, hvor Maven gaar over i Tarmen, Fig. 8, *q*, og danner to Stammer, hvoraf den ene i Regelen er meget kort, Fig. 8, *r*, og kunde snarere betragtes som en tyk Gren af den anden, der er den egentlige Hovedstamme, som gaar over i Udførselsgangen, Fig. 8, *s*. Denne er meget lang, har temmelig tynde Vægge, følger Spiserøret fortil, hvor den ved Vandkarringen lægger sig til Stenkanalen og løber langs med denne op til den indre Flade af Ryggens Hud, Fig. 8, *t*, 15, *e*, som den i Fællesskab med Stenkanalen perforerer, Fig. 29, *d*, og aabner sig paa Ryggens Overflade med en ganske lille Papille, Fig. 29, *e*. Aabningen er rund og omgiven, ligesom Stenkanalen, med en Krands Spikler, Fig. 29, *f*.

Udførselsgangen for Kjønsorganerne er skilt fra Stenkanalen ved et tyndt Lag Bindevæv, Fig. 29, *g*, men begge ere indesluttede af en Bindevævshud, Fig. 29, *h*, *h*, der sækformig omgiver dem og danner en Sinus (Kjønssinus). Saavel den korte, som lange Stamme af Kjønsorganerne deler sig i en større eller mindre Mængde lange, dels to-, dels tredelte Grene, eller slangeformige Rør, af hvilke de, der tilhøre Hannen, have en gulhvid Farve, ere meget lange og smale, hvorimod Hunnernes ere kortere, forme sig stundom som aflange Blærer og have en gulere Farve. Kjønsapparatet er især hos Hannen saa langt, at det indtager næsten Dyrets hele Længde. I histologisk Henseende frembyder det ingen Forskjellighed fra Kjønsorganerne hos de Holothurider, der have særskilt Kjøn.

Histologically, the nervous system in *Kolga* does not exhibit any fundamental difference from that hitherto met with in Holothurians. The radial nerve, Pl. I, fig. 10, *h*, is enclosed in a vessel, connate with the outer surface of the nerve, fig. 10, *i*; on the inner, fig. 10, *k*, it is open, and covered with epithelium. Between the inner half, or non-connate part of the vessel, and the longitudinal muscle, or longitudinal vessel, extends a strip of connective tissue, fig. 10, *l*, which acts protectively during the contraction of the muscles. The nervous trunk consists of a delicate fibrillous substance, composed, as it were, of 2 layers — one, viz. the outer layer, light in colour and broad, fig. 10, *m*, and the other, or inner layer, facing the open side of the vessel, comparatively dark and close in texture, but somewhat narrower, fig. 10, *n*. A septum of connective tissue, such as observed, for instance, by Dr. Teuscher in *Holothuria tubulosa*, does not occur in this genus; nor have we detected cells proper to the nerve (nervous cells). A transverse section of the radial nerve invariably presents a granulated appearance. The nervous ring does not appear to be enclosed in a vessel; if it is, the vessel must be connate with the nervous mass itself, which has the same structure as the radial nerves.

Generative Organs.

The sexes are separate, as in the genera *Elpidia* and *Irpa*. The generative organs, webbed by an exceedingly short, compact ligament to the dorsal mesentery, at the point where the stomach opens into the intestine, fig. 8, *q*, constitute two stems, one of which is as a rule extremely short, fig. 8, *r*, and may be regarded rather as a thick offshoot from the other, which passes into the eferent duct, fig. 8, *s*. The latter, which has thinnish walls, is very long; anteriorly, it accompanies the œsophagus, adjoining at the water-vascular ring the sand-canal, and running along it up to the inner surface of the dorsal integument, figs. 8, *t*; 15, *e*, which it perforates, simultaneously with the sand-canal, fig. 29, *d*, opening on the surface of the back through a minute papilla, fig. 29, *e*. The opening is circular, and surrounded, like that of the sand-canal, with a cincture of spiculæ, fig. 29, *f*.

A thin layer of connective tissue separates the generative apparatus from the sand-canal, fig. 29, *g*; both organs, however, have an integument of connective tissue, fig. 29, *h*, *h*, which envelops them like a sac, forming a sinus (genital sinus). Both of the stems constituting the generative organs branch out into a number of long bipartite and tripartite ramifications, or vermiform tubes, those in the male animal being of a yellowish-white colour, and exceedingly long and slender, whereas those in the females are shorter, sometimes occurring as ovate vesicles, and yellower in colour. The generative apparatus is so long, particularly in the males, as to extend throughout the entire length almost of the animal. Histologically, it is in no wise different from the generative organs in other Holothurians that have the sexes separate.

Dyrets Bevægelser ere temmelig træge; Fødderne og Tentaklerne strækkes langt ud og Kroppen ligesom skydes fremad, idet Legemet snart forlænges, snart forkortes. Under Forkortningen hvælver Ryggen sig overordentlig meget. Rygpapillerne kunne ligeledes forkortes og forlænges, uden egentlig at trækkes ind i Legemet; men naar de vare stærk sammentrukne, saa man kun Spidserne af dem, og da skjultes de stundom ganske, idet at Kraven svulmede stærkt op, og dannede ligesom en Kappe, der dækkede Papillerne.

Kolga ernærer sig væsentlig af Diatomeer og Foraminiferer; den sluger den fine Ler, hvori disse Væsener leve, i overordentlig stor Mængde.

Farven.

Huden er glasagtig gjennemsigtig, hvidagtig, saa at paa Steder, hvor den er sammentrukken, bliver den melkehvid. Tentaklernes 5-lappede Blad, især den af Spikler bebræmmede Del, er intens mørk orangegul. Mundskiven orangegul med en mørkere, næsten brun Ring om Munden.

Findested.

Station 295, Stat. 303.

Slægtskarakter.

Legemet bilateralt. Mundskiven, forsynet med 10 Tentakler, vender mod Bugfladen. Analaabningen paa Rygsiden. Paa den forreste Del af Ryggen en fremragende Krave, forsynet med Papiller. Strax foran denne to Aabninger, 1 for Kjønsorganet og 1 for Stenkanalen. Fødder paa begge Sider af Kroppen og omkring dennes bagerste Ende. Kjønnet adskilt. Ingen Tarmappendices (Lunger).

Artskarakter.

Legemet 50^{mm} langt, 15—20^{mm} høit og 12—15^{mm} bredt. Ryggen stærk hvælvet; paa Kraven 6 paa tvers staaende Papiller, hvoraf de to midterste ere de længste. 16 lange, tykke, næsten retraktile Fødder, hvoraf 5 paa hver Side og 6 omkring den bagerste Ende. Kroppens Hud gjennemsigtig. Tentaklerne 5-lappede, hver Lap 3-fliget.

Førend vi anstille nogle almindelige Betragtninger over det nu beskrevne Dyr, skulle vi omtale med nogle Ord Dr. H. Théel's smukke og i flere Henseender interessante Arbeide over Slægten *Elpidia*. Vi gjøre dette saa meget desto hellere, som vi have havt en god Del Exemplarer af dette Dyr til vor Raadighed, hvorved vi Skridt for Skridt ikke alene have kunnet følge hans Observationer; men ogsaa i det Væsentlige have kunnet constatere deres Rigtighed. Da Dr. Théel ikke har kunnet disponere over ret mange

This seems rather a sluggish species; its movements are effected by stretching out the suckers and tentacula and alternately elongating and contracting the trunk, the body being as it were jerked forward. During each contraction of the trunk the back is remarkably arched. The dorsal papillæ also admit of being shortened and lengthened, without however being strictly retractile; but when contracted to their full extent, the points only were visible, nay sometimes no part of the papillæ could be discerned, the collar swelling out and covering them as with a mantle.

Kolga subsists chiefly on *Diatomaceæ* and *Foraminifera*, by swallowing the soft clay in which these animals are embedded in enormous quantities.

Colour.

The skin is glassy, translucent, whitish, — milky-white when contracted. The tentacular, five-lobed pinnæ, more especially the part bordered with spiculæ, are of a deep, vivid orange. The oral disk orange, with a darker, almost brown ring round the mouth.

Locality.

Stations 295, 303.

Generic Character.

Body bilateral. The oral disk, furnished with 10 tentacula, facing the ventral surface. The anal aperture on the dorsal surface. On the anterior portion of the back a papillous, projecting collar. Immediately anterior to the collar two circular openings, the respective outlets for the genital organ and the sand-canal. Suckers on both sides of the trunk and round the terminal extremity. The sexes separate. No intestinal appendages (respiratory tubes).

Specific Character.

Body averaging 50^{mm} in length, 15^{mm}—20^{mm} in height, and 12^{mm}—15^{mm} in breadth. The back exceedingly arcuate; the collar furnished with 6 transverse papillæ, the middle pair the longest. Long, thick, almost retractile suckers, 16 in number, 5 on either side, and 6 round the terminal extremity. Skin of the body translucent. The tentacles five-lobed; each lobe subdivided into three lobules.

Before proceeding to supplement our description of this animal with a few general remarks, we will briefly notice Dr. H. Théel's elegant and valuable treatise on the genus *Elpidia*. We feel indeed specially called upon to do so, having had the good fortune to obtain a very considerable number of specimens of the animal in question, enabling us successively to renew his observations, which in all essential particulars coincide with our own. Unfortunately, the number of individuals examined by Dr. Théel was but

Exemplarer, ere Undersøgelserne i enkelte Dele blevne mindre udtømmende, end Tilfældet havde været under gunstigere Omstændigheder. Vore Observationer kunne forhaabentlig i nogen Grad raade Bod herpaa.

I det indre Bindevævslag hos *Elpidia* have vi fundet lignende elliptiske, skivedannede Kalklegemer, som de vi have beskrevet og afbildet hos *Irpa*. Hvad Muskulaturen betræffer, saa ere de saakaldte Ringmuskler paa den forreste og bagerste Del af Kroppen virkelig cirkulære, som af Théel bemærket, men paa den midterste Del gaa de ikke rundt, men ophøre enten ved Randen af Længdemusklerne eller et ganske lidet Stykke indenfor Randen, henimod Midten.

Vandkarsystemet hos *Elpidia* er ifølge vore Iagttagelser temmelig overensstemmende med det hos *Kolga* og *Irpa*. Fra Vandkarringen udgaa 5 temmelig korte Hovedstammer, hvoraf de to, der tilhører Biviet, dele sig hver i 2 Grene, der gaa til hver sin Tentakel, de to Sidestammer dele sig hver i 3 Grene, af hvilke den ene, som er den største, danner Længdekanalen, medens de to andre gaa til hver sin Tentakel; de 5 Hovedstammer dele sig altsaa i 12 Grene.

Dr. Théel har kun iagttaget 2 Sidekanaler, der efter ham udgik fra Vandkarringen; men han gjør udtrykkelig opmærksom paa, at han paa Grund af Undersøgelsernes Vanskelighed ikke har havt tilstrækkeligt Materiale for at komme til fuld Sikkerhed. Hvad der især tiltrak sig vor Opmærksomhed med Hensyn til Vandkarsystemet hos *Elpidia,* var de af Théel beskrevne Skillevægge (Klapper) i Længdekarrene (se Mémoire sur *l'Elpidia* par H. J. Théel, Tab. 5, Fig. 28, 29, *C, C),* og det saameget mere, som han ikke har fundet nogen Kontinuitet i Cirkulationen, idet de antagne Skillevægge ikke vare forsynede med nogen Aabning, men vare i hele Circumferentsen fastvoxede til Karrets indre Væg, saa at der skulde være et særeget afsluttet Rum imellem 2 Skillevægge, og fra dette Rum skulde Karret udbugte sig og danne Fodampullen.

Den ovenciterede Afbildning, som ledsager Beskrivelsen, er i det Væsentligste aldeles korrekt; men da Dr. Théel ikke har iagttaget nogen Kontinuitet i Længdekarrets Lumen, — er hans Opfatning bleven ganske forskjellig fra den, vore Undersøgelser have ledet os til. Nogen fuldstændig Injektion af Længdekarret er det ikke lykkedes os at foretage; derimod have vi kunnet drive de i Injektionsvædsken indeholdte Luftblærer igjennem Karrets hele Længde, hvorved vi have overbevist os om, at Længdekanalen ikke er afbrudt ved Skillevægge; men at Vandvædsken uhindret cirkulerer hos *Elpidia* ligesom hos andre Holothurider[1].

[1] Herover have vi nærmere udtalt os i en Afhandling optaget i "Magazin for Naturvidenskaberne," 25 Bind, pag. 101.

limited, and hence his results are less comprehensive than would otherwise have been the case. Our observations will, we hope, serve to complete his description.

In *Elpidia* we have detected in the inner layer of connective tissue elliptic, discoid calcareous corpuscles similar to those occurring in *Irpa*, which are described and figured in our paper on that genus. With regard to the muscular development, the so-called annular muscles on the anterior and posterior portions of the trunk did indeed prove to be strictly circular, as noticed by Dr. Théel, but in the medial region their form is not that of a perfect ring, since they terminate at the margin of the longitudinal muscles or almost immediately within it, never meeting in the middle.

The aquiferous system in *Elpidia,* according to our observations, presents a close resemblance to that in *Kolga* and *Irpa*. From the vascular ring protend 5 principal stems, comparatively short; 2 of these, belonging to the bivium divide dichotomously, each of the branches proceeding to a tentacle; the two lateral stems divide trichotomously, one of the branches — the largest — forming the longitudinal canal; the remaining two proceed each to a tentacle. The 5 principal stems divide therefore into 12 branches.

Dr. Théel has not observed more than 2 lateral canals, which, according to his diagnosis, issue from the water-vascular ring; but he lays particular emphasis on the fact, that with so complex a structure the materials before him were insufficient to arrive at absolute certainty. A characteristic peculiarity connected with the aquiferous system in *Elpidia* that attracted our special notice, was the valvular septa in the longitudinal vessels, minutely described by Dr. Théel *(vide* Mémoire sur *l'Elpidia,* par H. J. Théel, Pl. 5, figs. 28, 29, *C, C),* particularly since that naturalist has failed to detect any continuity in the circulation, the supposed septa not being furnished with an aperture, but having their whole circumference connate with the inner wall of the vessel; hence two septa would enclose a separate space; and from this space the vessel is said to bulge out, forming the pedal ampulla.

The figure accompanying the description referred to above, agrees in the main with what we have ourselves observed, but Dr. Théel not having detected any continuity in the lumen of the longitudinal vessel, he naturally entertains on this point quite a different view to that which we have been led to adopt. A complete injection through the longitudinal canal we have failed to effect, whereas the bubbles of air contained in the fluid injected were repeatedly forced down the entire length of the vessel, affording to us satisfactory proof that the longitudinal canal is not interrupted in its course by septa, but that the aquiferous fluid circulates freely in *Elpidia,* as in other Holothurians.[1]

[1] We have treated this subject more at large in a Memoir which appeared in "Magazin for Naturvidenskaberne," 25 Bind, pag. 101.

Endelig skulle vi omtale Stenkanalen, der ender blindt udad, hvor den efter at have perforeret Muskelhuden fæster sig til Coriums indre Flade. Stenkanalen er ifølge Théels Iagttagelser fri for Kalk og uden Madreporplade; kun en Gang mener han at have seet et lille Legeme af 0.02mm Diameter, og som forekom ham at bestaa af bueformige Spikler, der havde sit Sæde paa Stenkanalens øverste Del. Vi kunne supplere dette derhen, at paa den yderste (øverste) Ende af Stenkanalen, der hvor den er fastvoxet til Huden, findes smaa bueformige Kalkspikler, der dels ligge enkeltvis og ligesom omgive Kanalen, dels ere de noget større, ligge samlede og danne Fletninger, der kunne ansees for en rudimentær Madreporplade, Fig. 16, *a,* 16′; hvorvidt der i Kalkfletningernes Masker ere Aabninger eller Spalter, der føre ind til Kanalen, kunne vi ikke afgjøre; thi Fletningerne ligge egentlig i det Bindevæv, hvorved Kanalen er fæstet til Huden, Fig. 16, *a.*

Slægten *Kolga* maa med Hensyn til den Plads, den indtager i Holothuridernes Række, stilles meget lavt. Den er i enkelte Henseender bleven staaende paa Larvestadiet, — saaledes aabner Stenkanalen sig udad med en Pore, hvorved Vandkarsystemet, ligesom hos Larven, staar i umiddelbar Forbindelse med Søvandet, noget der ikke tidligere har været paavist hos nogen Holothuride. Ser man saa hen til den øvrige Organisation, — saa finde vi: at Vandkarsystemet er temmelig ufuldkomment, har kun to Længdekar; at Hudens Bindevæv er gjennemgaaende hyalint, har ikke kunnet hæve sig op til en fibrillær Form; at Kalken, som findes i den, har Spikelformen, og kun paa et enkelt Sted, Mundskiven, og det endog meget sparsomt, antager en mere sammensat Skikkelse, nemlig gjennemborede Skiver. Det indre Skelet, som bestaar af 5 yderst smaa Kalkstykker med fine udløbende Spikler, kan betragtes som rudimentært, tjener ikke til Støtte eller Fæstepunkt for Længdemusklerne; thi dertil er det altfor spædt, og minder om Kalkstaphelierne hos Echinodermlarverne. Tarmkanalen er ikke forsynet med de Afsondringsorganer, som man har kaldt Lunger. Nervesystemet kunde i første Øieblik synes at staa temmelig høit paa Grund af den Masse Sandseorganer (Høreblærer), som findes paa de to Ambulacralnerver; men erindrer man, at det netop er hos en anden lavtstaaende Holothuride *(Synapta),* og hos enkelte Echinodermlarver, at lignende Organer ere fundne, saa forekommer det os, at denne Særegenhed ved Nervesystemet ikke kan give Anledning til at sætte Slægten *Kolga* høiere op i Rangen. Naar man ser hen til den overordentlig store Mængde af det nævnte Sandseorgan, som findes langs Ambulacralhjernen, saa kunde man fristes til at spørge, om disse Organer virkelig staa i Hørelsens Tjeneste; thi det er ikke godt at forstaa, at et saa lavtstaaende Dyr skulde være saa rigt udstyret for Sandsningens Vedkommende.

In conclusion, we will briefly notice the sand-canal, which, exteriorly, has a cæcal termination, at the point where, after piercing the muscular layer, it is webbed to the inner surface of the corium. According to Dr. Théel, the sand-canal exhibits no trace of calcareous deposit, nor is it furnished with a madreporic body; once only does he believe to have detected a minute corpuscle, 0.02mm in diameter, composed apparently of arcuate spiculæ, near the upper extremity of the stem. This observation we are enabled to supplement, in so far as the superior termination of the sand-canal, where it is connate with the skin, exhibits numbers of minute, arcuate calcareous spiculæ, some disposed singly, and, as it were, circumscribing the stem, the others, somewhat larger in size, being laced together, forming a spiniferous network, which may be regarded as a rudimentary madreporic body, fig. 16, *a,* 16′; but whether the meshes of this calcareous network assume the form of more or less circular openings, or of fissures, we are unable to determine, the network lying embedded in the layer of connective tissue that webs the stem to the integument, fig. 16, *a.*

As regards its position in the scale of organic development, the genus *Kolga* ranks very low among the *Holothuriidæ.* In several respects indeed it has not emerged from the larval stage: thus, for instance, the sand-canal opens exteriorly through a pore, with which the aquiferous system communicates directly with the sea-water, a characteristic feature not previously observed in any Holothurian. Glancing further at the anatomical structure of the animal, we find the aquiferous system, which is rather simple in development, furnished with two longitudinal vessels; the connective tissue of the integument, too, is hyaline throughout, exhibiting nowhere traces of having attained a fibrillous character; moreover, the calcareous deposit it contains is of the spicular form; on one part only of the organism — the oral disk, and even there to a limited extent, does it assume a more complex structure, occurring as perforated laminæ. The inner skeleton, which consists of 5 exceedingly minute calcareous plates, with slender protending spiculæ, may be regarded as rudimentary, since it does not serve to strengthen the longitudinal muscles, or to furnish them with a point of attachment: indeed it is far too fragile, bearing considerable resemblance to the calcareous staphellæ in the larval forms of Echinodermata. The intestinal canal is not provided with the secretory organs which have been termed respiratory trees. At the first glance the nervous system does indeed seem to be highly developed, by reason of the large numbers of sensoria (auditory vesicles) on the two ambulacral nerves; but if we call to mind that similar organs occur in another low-organized Holothurian *(Synapta),* and in a few larval forms of Echinodermata, this peculiar feature in the nervous system is, we conceive, quite inadequate as a reason for placing the genus *Kolga* higher up in the scale of structural development; nay the immense number of these sensoria is in itself suspicious; it would seem to warrant our doubting their alleged subservience to the

Slægten *Elpidia* maa efter vor Opfatning stilles nærmest *Kolga* i den systematiske Række, men over denne. Vi kunne ikke være enige med Dr. Théel, der sætter *Elpidia* meget hoit, idet han udtrykker sig saaledes: "Cependant, d'après la description que j'ai l'honneur de présenter à l'Académie, il ressort qu'il se trouve à un degré de développement bien supérieur à celui de toutes les Holothuries connues jusqu'à présent, témoin en particulier la symétrie bilaterale sensiblement accentuée chez lui."

Den bilaterale Form, der er temmelig stærk udpræget hos *Elpidia* og endnu skarpere hos *Kolga*, er det fornemmelig Théel lægger Vægten paa, naar han stiller *Elpidia* saa høit i Udviklingsrækken; men ser man hen til, at en Mængde Echinodermlarver have en bilateral Form, og at denne f. Ex. hos Slægten *Psolus* ingenlunde har begrundet dennes systematiske Stilling, saa kunne vi ikke medgive, at den bilaterale Form kan tynge stærkt i Vægtskaalen, hvor det gjælder Anordningen i Systemet. Her forekommer det os, at der maa tages væsentlig Hensyn til den hele Organisation, og gjor man dette for *Elpidias* Vedkommende, saa viser det sig, at Huden visselig indeholder en stor Mængde Kalk; men Spikelformen er den mest fremtrædende; og de smaa Hjul, som foruden Spiklerne ere tilstede, tyde hen paa et svagt Slægtskabsforhold med Chirodoterne, temmelig lavtstaaende Holothurider. Det indre Skelet er jo bygget omtrent som hos *Kolga*, kun noget stærkere; men Spikeldannelsen er der, og det er uskikket til Fæstepunkt for Længdemusklerne. Stenkanalen er med sin yderste Ende fastvoxen til Huden; men nogen udviklet Madreporplade findes ikke; kun der, hvor Sammenvoxningen finder Sted, altsaa paa Stenkanalens yderste (øverste) Ende, iagttages en Kalkfletning, der er Begyndelsen til en Madreporplade — et Skridt over Larvestadiet. Vandkarsystemet har kun to Ambulakralkar og Tarmkanalen intet Appendix (Lunger). Nervesystemet er som hos *Kolga*, kun er der langt færre Høreorganer, end hos denne. Alt dette tyder dog hen paa en lavere Organisation, end hos de fleste Holothurier.

Slægten *Irpa* har jo mange Berøringspunkter med baade *Elpidia* og *Kolga*, og kan ikke stilles synderlig høiere end disse; men den har dog Noget, der fjerner den lidt længere fra Larvestadiet, end de to nævnte, og det er, at paa Stenkanalen, strax indenfor den Ende, der er fastvoxen til Huden, er en udviklet Madreporplade.

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auditory properties; for it is hard to conceive that an animal ranking in other respects so low should be highly endowed in this.

Elpidia must, we opine, in the systematic order of arrangement be placed next to *Kolga*, but next above that genus. We cannot agree with Dr. Théel in giving a high rank to *Elpidia*. He says in his Memoir: — "Cependant, d'après la description que j'ai l'honneur de présenter à l'Académie, il ressort qu'il se trouve à un degré de développement bien supérieur à celui de toutes les Holothuries connues jusqu'à présent, témoin en particulier la symétrie bilaterale sensiblement accentuée chez lui."

The bilateral form, which is rather a prominent feature in *Elpidia*, distinguishes in a still higher degree *Kolga*, and it is this character that has chiefly induced Dr. Théel to give *Elpidia* so high a grade in the scale of development; numbers of the larval forms of Echinodermata are bilateral, but this has not been the character — in ranking the genus *Psolus* for instance — determinative of systematic position; and hence we cannot concede that bilaterality of form should have any material influence thereupon. In arriving at such a decision, the organization as a whole should, in our opinion, be the chief criterion to be guided by; and assuming this to be the case, *Elpidia* must descend to a lower status. It is true, the skin in this genus contains a very large amount of calcareous deposit, but the spicular form greatly predominates; and the rotated corpuscles, or wheels, that occur along with the spiculæ, would seem to indicate a slender link of connexion with the *Chirodotæ*, rather low-graded Holothurians. The structure of the inner skeleton is much the same as in *Kolga*, only somewhat stronger; but here, too, the spicular formation constitutes a leading feature, and renders it of no service as a point of attachment for the longitudinal muscles. The sand-canal is connate at its upper extremity with the integument, but there is no fully developed madreporic body; where the skin and the stem unite, however, at the upper extremity of the latter, occurs a calcareous web — the rudimentary indication of a madreporic body, showing the animal to rank a grade above the larval stage. The aquiferous system is furnished with two ambulacral vessels; the intestinal canal has no appendix (respiratory tubes). The nervous system is similar to that in *Kolga*, save in the number of auditory vesicles, which is far more limited. But, taken together, all these structural details assuredly point to a lower organization than is met with in most Holothurians.

The genus *Irpa* presents numerous points of resemblance to both *Elpidia* and *Kolga*, and cannot be ranked much higher than the two latter genera in the scale of development; it has, however, a character removing it a step farther from the larval stage than is either of those animals, viz, a fully developed madreporic plate on the sand-canal, in immediate proximity to the point at which the latter is connate with the skin.

Irpa[1] abyssicola, n. g. n. sp.

Tab. IV. Fig. 1, 2, 3.

Den Holothuride, vi nu skulle beskrive, har, som vi senere skulle paavise, flere vigtige Berøringspunkter med Slægterne *Elpidia* og *Kolga;* men adskiller sig dog saameget fra dem, at vi have fundet det nødvendigt at danne en ny Slægt for den. Destoværre maa vi beklage, at vi kun have havt et enkelt Exemplar til vore Undersøgelser, og selv dette var temmelig contraheret ved dets Opbevaring i Spiritus. Det blev optaget fra et meget stort Dyb (1050 Favne), og under et overordentligt stormende Veir, saa det ikke var muligt at anstille videregaaende Iagttagelser, medens det levede.

Legemet er 21^{mm} langt, 6^{mm} bredt, noget smalere imod den forreste tvert-afskaarne Ende, som er forsynet med 10 haandformig-fligede Tentakler, som sidde i en Krands rundt Kroppens forreste Rand, Tab. 4, Fig. 1, 2. Mundskiven er lidt hvælvet og foldet, og Munden sidder næsten i Centrum, dog nærmere Bugfladen, Fig. 4^{a}. Legemets bagerste Ende er afrundet, og paa dets Midte, nærmere Rygsiden er den lidt aflange Analaabning, Fig. 1, 2, *a, a.*

Kroppen har en udpræget Bug- og Rygside. Bugsiden er lidt fladtrykt og glat, Fig. 1. Rygsiden er hvælvet, og har paa den øverste Trediedel 2 paalangsgaaende Rækker koniske Papiller, 4 i hver Række, imellem hvilke sees to paatvers staaende større koniske Papiller. Rækkerne ere konvergerende forfra bagtil, og hver Rækkes Papiller staa lige overfor hverandre. De forreste Papiller ere fjernede omtrent 3^{mm} fra Kroppens forreste Rand, Fig. 2. Strax bagenfor denne, imellem Grunden af 2 Tentakler, findes en lille rund Aabning for Kjønsorganernes Udførselsgang, Fig. 2, *b*. Der, hvor Bug- og Rygsiden støde sammen, dannes paa hver Side og paa den bagerste Ende en afrundet Rand, og paa denne iagttages 24 cylindriske, stive Fødder, 9 paa hver Side, og 6 paa Enden, Fig. 1, 2.

Dyrets Hud er læderagtig, seig og meget kontraktil; den dannes af en klar, yderst tynd, gjennemsigtig, strukturløs Cuticula, indenfor hvilken er et enkelt Epithellag af Cylinderceller, der fæster sig til Læderhuden (Corium). Denne er temmelig fast og bestaar af et stærkt fibrillært Bindevæv, i hvis ydre Lag forskjelligformede Kalklegemer ere leirede, Fig. 4, imedens i det indre findes spredte dels Celler med et kornet Indhold, lig Semper's Slimceller, dels forlængede Bindevævslegemer, og dels yderst smaa Kalkkorn.

[1] Irpa er en Sagngudinde, tilhørende den nordiske Mythologi. Hun henregnedes til de onde Aander, som forlangte Menneskeofre for de Tjenester, hun ydede.

Irpa[1] abyssicola, n. g. n. sp.

Pl. IV, figs. 1, 2, 3.

The Holothurian we are about to describe, exhibits, as will afterwards be shown, several points of close resemblance to the genera *Elpidia* and *Kolga,* but is on the other hand so characteristically distinct from both, that we do not hesitate to establish a new genus for its reception. We have, we regret to say, been unable to obtain more than a single specimen of this animal, and this individual had become a good deal shrunk from being preserved in spirits. It was brought up from a very considerable depth (1050 fathoms), and in a heavy gale of wind, so there was no possibility of instituting comprehensive observations on the living animal.

The body measures 21^{mm} in length and 6^{mm} in breadth, but is somewhat slenderer at the anterior truncated extremity, which is furnished with 10 palmate-lobed tentacula, encircling the anterior margin of the body, Pl. 4, figs. 1, 2. The oral disk is slightly arcuate, the mouth itself being almost in the centre, a very little nearer the ventral surface, fig. 4^{a}. The posterior extremity of the body is rounded, and on the middle portion, slightly approximating to the dorsal surface, occurs the somewhat ovate anal aperture, fig. 1, 2, *a, a.*

The body has a distinct dorsal and ventral surface. The ventral surface is slightly depressed and smooth, fig. 1. The dorsal surface is convex, and exhibits on its upper third two longitudinal series of conic papillæ, 4 in each series, between which are seen two larger, transversely placed conic papillæ. The series are posteriorly convergent, and the papillæ in each opposite one to the other. The foremost papillæ are removed about 3^{mm} from the anterior margin of the body, fig. 2. Immediately posterior to the latter, between the bases of 2 tentacula, occurs a small circular opening, for the genital duct, fig. 2, *b*. Where the ventral and dorsal surfaces meet, extends on either side of the body, and round its posterior extremity, a continuous convexed margin, disposed along which are seen 24 cylindric, rigid suckers, 9 on each side, and 6 bordering the extremity.

The animal is covered with a tough, coriaceous, and in a high degree contractile integument, composed of an exceedingly thin, translucent, structureless cuticle, beneath which is a single epithelial layer of cylindric cells, webbed to the corium. The latter is firm in texture, consisting of strong fibrillous connective tissue, with multiform calcareous corpuscles dispersed through its outer layer, fig. 4; the inner exhibits a multitude of scattered cells, containing a granulated substance, like that in Semper's mucous cells, and, exclusive these, elongate corpuscles of connective tissue, and minute calcareous globules.

[1] A goddess of Northern Mythology. She was classed among the evil spirits, being a malignant deity, to whom were offered human sacrifices as the price of her favour.

Indenfor Læderhuden ere de to Muskellag, nemlig Tvermusklerne og Længdemusklerne. Tvermusklerne, der ere bundne til den indre Flade af Corium, danne næsten en sammenhængende Hud, kun skilte fra hverandre ved en yderst fin Bindevævsstribe, hvori findes smaa Kalkkorn. Henimod Dyrets bagerste Ende blive Tvermusklerne noget stærkere og danne her en Sphincter omkring Analaabningen. I den forreste Ende hjælpe de til at danne Sphincteren om Munden. Hvorvidt disse Tvermuskler gaa uafbrudt rundt Legemets indre Hudflade og saaledes danne virkelige Ringmuskler, eller de ere afbrudte ved Længdemusklerne, skulle vi ikke med Sikkerhed kunne afgjøre, da vi ikke have havt Materiale nok til en saadan Undersøgelse, der forøvrigt frembyder adskillige Vanskeligheder; men efter hvad vi have seet, tro vi helst, at de virkelig ere afbrudte i Lighed med, hvad vi anførte ved at omtale Tvermusklerne hos *Trochostoma*[1].

Længdemusklerne ere 5, hvoraf 2 paa Ryg- og 3 paa Bugfladen. De strække sig fra Munden til Analaabningen, ere enkelte, temmelig tykke, omtrent 0.8^{mm} brede, og bindes foruden til Corium ogsaa til Tvermusklerne med en Mængde stærke Bindevævstraade, Fig. 3, *a*. Paa Dyrets bagerste Ende blive de noget smalere, og paa den forreste, hvor de ligeledes smalne af, gaa de over paa Mundskivens Underflade og fæste sig i Nærheden af Munden. Muskellaget er beklædt med Bughinden (Peritoneum), der dannes af Bindevæv, hvori findes enkelte Muskelfibre, yderst smaa, spredte, aflange Kalkkorn, og paa hvis indre Flade er et flimrende Epithelovertræk.

I Kroppens Hud findes Kalklegemer, der optræde under to Hovedformer, nemlig som Stave (Spikler) og som elliptiske Skiver. Spiklerne ere temmelig spredte og kun paa enkelte Steder, saasom henimod Fødderne, mere samlede. De ere meget smaa, fra 0.054—0.080^{mm} lange, og fra 0.002—0.003^{mm} brede, have hyppigst en krummet Form, noget nærmende sig Hesteskoens, Fig. 5, 5, 5, medens enkelte ere næsten lige, Fig. 4, 6, 6. De have paa Midten en Knude, og mod begge Ender ere de tildels forsynede med fine Takker. Fig. 5, 6, 7, kun yderst sjelden ere de forgrenede, Fig. 8. Det er især i det ydre Lag af Læderhuden, at disse Spikler ere leirede, dog hænder det, at man ogsaa træffer enkelte i det indre Lag.

De elliptiske Kalklegemer findes væsentligst i det indre Lag; men dog støder man paa dem imellem Kalkspiklerne i det ydre Lag. De ere flade, bestaa af en peripherisk Del, som er bredest og ufarvet, og et Centrum, der

[1] Magazin for Naturvid. 24 B., pag. 232. Christiania 1878.

Underneath the corium are the two muscular layers, consisting of transverse and longitudinal muscles. The transverse muscles, which are attached to the inner surface of the corium, constitute an almost continuous integument, separated as they are by an exceedingly thin strip of connective tissue, in which occur minute calcareous granules. In close proximity to the posterior extremity of the body, the transverse muscles become somewhat stronger, forming a sphincter round the anal opening. At the anterior extremity, they contribute in forming a sphincter round the mouth. Whether these transverse muscles uninterruptedly encircle the body on the inner surface of the integument, and thus constitute true annular muscles, or whether they are intersected by the longitudinal muscles, we have as yet been unable to determine; the materials before us were far too scanty for arriving at a decision on so intricate a subject, the investigation of which must in itself be attended with very considerable difficulty; but, judging from the data our observations have supplied, we are prone to believe there is an intersection, such as occurs in *Trochostoma*, to which we called attention when describing the transverse muscles in that genus.[1]

The longitudinal muscles are 5 in number — two on the back and three on the belly. They extend from the orifice of the mouth to the anal opening, are disconnected, rather thick, about 8^{mm} broad, and webbed to the transverse muscles as well as to the corium by numerous filaments of connective tissue, fig. 3, *a*. At the posterior extremity of the body they diminish in thickness, and at the anterior, where they likewise assume a more slender appearance, they protend to the under surface of the oral disk, being connected with it in the vicinity of the mouth. The muscular layer is covered by the peritoneum, consisting of connective tissue, in which are a few muscular fibres, numbers of scattered, exceedingly minute, oblong calcareous particles, and with a ciliated epithelial tunic on its inner surface.

In the skin of the body are numbers of calcareous corpuscles, occurring principally in two forms, — as slender acuminate rods (spiculæ) and as elliptic plates. The spiculæ are rather scattered, exhibiting at a few points only, in proximity to the suckers for instance, a closer arrangement. They are exceedingly minute, from 0.054^{mm} to 0.080^{mm} in length, and from 0.002^{mm} to 0.003^{mm} in breadth, and the greater part curvate, not unlike a horseshoe, figs. 5, 5, 5, some, however, almost straight, figs. 4, 6, 6. In the middle of each spicula occurs a small protuberance, and parts of both extremities are minutely serrated, figs. 5, 6, 7; but very few of these spiculæ branch, figs. 8. It is more especially the outer layer of the corium through which the spiculæ are distributed, a few only being met with in the inner.

The elliptic corpuscles occur chiefly in the inner layer; some however are dispersed among the spiculæ in the outer. They are flat in appearance, and consist of two parts, one peripheric and uncoloured, which is the broadest, and one

[1] Magazin for Naturvid. 24 Bind, pag. 232. Christiania 1878.

synes at dannes af concentriske Ringe, som omgive en aflang Fordybning, der har en smuk vinrød Farve, og hvori tildels findes flere smaa, lysbrydende Korn, Fig. 9. De have en Længde af 0.013 mm. Disse elliptiske Legemer findes meget udbredte i Vævene, hvor der forøvrigt ingen Kalk findes, saaledes i Mundskivens og Rygpapillernes Bindevæv, i Peritoneum etc.

Imedens Kroppens Hud er temmelig fattig paa Kalk, er det modsatte Tilfældet med Fødder og Tentakler. Fødderne, der langs Siderne sidde ligeoverfor hverandre, Fig. 1, 2, danne stive cylindriske Rør, i hvis Bindevæv findes en stor Mængde Kalkspikler, som ligge tæt paa hverandre og kredsformig omgive Foden, lig en Filegrans Kalkkapsel. Indenfor Bindevævslaget er en Muskelhud, som bestaar af Ring- og Længdefibre, og til denne er ved et fint Bindevæv fæstet den Sidegren af Vandkarsystemets Længdekar, som gaar ind i Foden.

De Kalkspikler, som findes i Fødderne, ere noget forskjellige fra Hudens. De ere meget større, have en Længde af 0.614 mm og en Bredde af 0.041 mm, ere mere eller mindre krumbøiede, stundom dog ganske lige, og ere besate med en stor Mængde Takker, der ofte, især i begge Ender, staa saa tætte, at Spiklerne faa Udseende af at være saugtakkede, Fig. 10. Paa enkelte Spikler udgik fra Midten en stærk Arm, der endte ganske spids, og selv denne Arm var temmelig takket. Paa Enden af Foden, der er konisk, men som kan afplaneres, er ingen Kalkskive; men her findes flere mindre Kalkspikler, som hjælpe til at danne Hvælvet af den hule Kegle, Fig. 12. Forøvrigt findes i det indre Lag af Bindevævet ogsaa de tidligere omtalte elliptiske Kalkskiver. Fødderne kunne ikke indtrækkes i Legemet, heller ikke synderlig forkortes, derimod kunne de bevæges i forskjellige Retninger, og dette sker da ved deres Grunddel, hvor Kalkspiklerne ere i ringere Mængde tilstede.

Tentaklerne ere omkring 3 mm lange, hvoraf Skaftet udgjør omtr. 2 mm og Bladet 1 mm. Skaftet er cylindrisk, lidt fladtrykt mod den adorale Side, Fig. 13, *a*, og dannes, foruden af sin Cuticula og Epithelet, af et temmelig fast, tykt Bindevævslag, hvori enkelte smaa Kalkspikler og de elliptiske Kalklegemer ere leirede; indenfor Bindevævslaget er en Muskelhud, som bestaar af Ring- og Længdemuskler, og til denne Muskelhud er Tentakelkarret bundet ved et tyndt Bindevævslag. Den bredere eller haandformige Del af Tentakelen bestaar af 5 Forlængelser, Fig. 13, *b*, der hver har i Regelen 3 Indskjæringer, Fig. 13, *c*, hvorved enhver Forlængelse bliver tredelt (trelappet), saaledes nemlig, at den midterste Lap er den største, Fig. 13, *d*. Hele denne haandformige Del med samtlige Forlængelser og Lapper ere overordentlig rige paa Kalkspikler. De danne her ved deres Sammenfletninger smukke Kalkpantsere og

central, composed apparently of concentric rings, circumscribing an oblong excavation, of a fine vinous colour, in which occur here and there several minute refractive granules, fig. 9. They have a length of 0.013 mm. These elliptic corpuscles are particularly numerous in the tissues, where there is no calcareous deposit, — for instance in the connective tissue of the oral disk and of the dorsal papillæ, in the peritoneum, &c.

The skin of the body appears on the whole rather sparingly furnished with calcareous deposit, whereas the reverse is the case with the suckers and tentacula. The lateral suckers, arranged in opposite rows, figs. 1, 2, constitute stiff cylindric tubes, exhibiting in their connective tissue a large number of calcareous spiculæ, crowded together, and encircling the sucker as with a calcareous filigrane capsule. Underneath the layer of connective tissue extends a muscular tunic, composed of annular and longitudinal fibres, a thin connective membrane webbing to this integument the lateral branch of the longitudinal vessel of the aquiferous system, which is prolonged into the sucker.

The calcareous spiculæ in the suckers differ slightly from those in the integument of the body. They are much larger, measuring 0.614 mm in length and 0.041 mm in breadth, more or less arcuate, — here and there however quite rectilinear, — and furnished with a large number of dentelli, which in places, more particularly at both extremities, are so densely disposed as to give the spiculæ a serrated appearance, fig. 10. From the middle of some of the spiculæ proceeds a strong prolation, terminating in a sharp point, and this even was to a considerable extent indented. At the extremity of the sucker, which is conical in form, but the apex of which can be depressed, leaving a plane surface, there is no calcareous plate; but here occur divers smaller spiculæ, which help to build up the vaulted summit of the hollow cone, fig. 12. For the rest, the elliptic calcareous plates also occur in the inner layer of connective tissue. The suckers cannot be retracted into the body, nor are they to any considerable extent contractile; they admit however of being freely moved about in different directions, the motory power proceeding from the basal extremity, where the calcareous spiculæ are less numerous.

The tentacles are about 3 mm in length, the shaft measuring 2 mm and the pinna 1 mm. The shaft is cylindric in shape, slightly depressed on the adoral side, fig. 13, *a*, and composed, exclusive of the cuticle and the epithelium, of a layer of connective tissue, comparatively thick and firm in texture, through which are dispersed a few minute calcareous spiculæ and the elliptic calcareous corpuscles. Beneath the layer of connective tissue extends a muscular integument, consisting of annular and longitudinal muscles; and to this muscular integument the tentacular vessel is webbed by a thin layer of connective tissue. The broader or palmate portion of the tentacles consists of 5 pinnæ, fig. 13, *b*, each of which, having as a rule 3 incisions, fig. 13, *c*, is accordingly trifid (three-lobed), the middle lobe being the longest, fig. 13, *d*. The whole of this palmate portion, including the pinnæ and their

have nogen Lighed med Føddernes Kalkspikler, men ere dog lidt forskjellige fra disse i Form, ligesom de ere noget mindre. Som oftest ere Tentaklernes Spikler forgrenede snart i den ene, snart i begge Ender, og synes at være rigere paa Takker, Fig. 11. Ogsaa i denne Dels indre Bindevævslag træffer man paa de elliptiske Kalklegemer, forøvrigt er den histologiske Bygning den samme, som i Skaftet. Tentaklerne kunne indtrækkes til den bredere Del, altsaa kun Skaftet kan trækkes ind i Legemet og Tentakelen paa den Maade forkortes; men ligesom Tilfældet er med Fødderne, saaledes ogsaa med Tentaklerne; den rige Spikelbeklædning lægger Hindringer iveien for, at de ganske kunne skjules i Kropshulheden.

Fordøielsesorganerne tage sin Begyndelse ved Mundaabningen, hvor Indgangen til Svælget (Atriet) er temmelig vid og foldet, meget muskuløs, og bidrager til at danne den stærke Sphincter omkring Munden. Svælget er meget snevert, temmelig langt, Fig. 3, *b*, og bundet til Kalkringen ved en Mængde muskuløse Traade, ligesom der fra dets ydre Flade afgaa mange fine Bindevævstraade til Mundskivens bagerste Flade. Det er beklædt af det flimrende Peritoneum, indenfor hvilket findes et tyndt Bindevæv, hvortil Ringmuskellaget er bundet. Umiddelbart paa dette hvile Længdemusklerne; saavel Ring- som Længdemusklerne synes ikke at være adskilte i Bundter; men Fibrene løbe parallel med hverandre, saa det faar Udseende af at være en sammenhængende Hud. Indenfor Længdemusklerne er atter et Bindevævslag, hvori sees en rig Karudbredning. Til dette Bindevævslag fæster sig et tykt Lag af Cylinderepithel, der bidrager til at danne de stærkt fremspringende Længdefolder, hvormed Svælgets indre Flade er forsynet.

Lidt bagenfor Vandkarringen gaar Svælget over i Maven, der danner en aflang sækformig Udvidning, som er temmelig muskuløs; men hvis Vægge dog ikke ere saa tykke, som Svælgets, Fig. 3, *c*. Paa Mavens indre Flade findes ligeledes en Mængde Folder, der rage ind i Hulheden. Saavel Svælget som Maven havde en jævn brunligrød Farve og vare tomme. Hvor Maven gaar over i Tarmen er en Indsnøring. Tarmen dreier sig strax mod Venstre, hvor den gjør en Bøining, gaar saa næsten horizontalt langs Bugfladen bagover til den bagerste Trediedel af Kropshulheden, Fig. 3, *d*; her bøier den sig atter, gaar nu forover og skraat over til høire Side, næsten i Niveau med første Slynge, Fig. 3, *e*, og sender nogle Bindevævsbaand over til Maven, Fig. 3, *f*; herfra gjør den en Bøining, idet den gaar paany bagover noget paa skraa, Fig. 3, *g*, indtil den ved Begyndelsen af Kropshulhedens bagerste Trediedel danner et Knæ for i Midten af Hulheden at gaa horizontalt bag mod Anus, Fig. 3, *h*. Paa denne horizontale Del, der maa ansees for Rectum, er en temmelig tydelig Udvidning,

lobes, is furnished in great abundance with calcareous spiculæ. Here, being as it were braided together, they assume the appearance of an elegant armature, presenting in other respects some resemblance to those in the suckers, though slightly different in form, and smaller. The greater part of the tentacular spiculæ are branched, some at one extremity, others at both; their dentelli, too, are apparently more numerous, fig. 11. In this part also occur the elliptic calcareous corpuscles, distributed through the inner layer of connective tissue; the histological structure is in other respects similar to that of the shaft. The tentacles can be retracted up to their broader part, that is to say, the shaft alone admits of being withdrawn into the body, and to that extent accordingly they are contractile; but, as with the suckers, so with the tentacles, the spicular surface of the integument prevents their being wholly concealed in the perivisceral cavity.

The digestive organs originate at the oral aperture, or rather at the entrance to the gullet (the atrium), which is rather wide and folded, and exceedingly muscular, contributing to the formation of the powerful sphincter surrounding the mouth. The gullet is remarkably narrow, rather long, fig. 3, *b*, and webbed to the calcareous ring by a number of muscular filaments; from its outer surface, too, numerous slender filaments of connective tissue proceed to the posterior surface of the oral disk. It is covered by the ciliated peritoneum, beneath which extends a thin connective membrane, to which is webbed the layer of annular muscles. Above, and in direct contact with, the latter, are the longitudinal muscles; neither the annular nor the longitudinal muscles would appear to be arranged in fascicles; but their fibres run parallel to one another, giving the appearance of a continuous skin. Under the longitudinal muscles occurs another layer of connective tissue, in which is seen an extensive vascular arrangement. This layer of connective tissue is webbed to a thick layer of cylindric, cellular epithelium, which contributes to the formation of the abruptly projecting longitudinal folds on the inner surface of the gullet.

A little posterior to the water-vascular ring, the gullet opens into the stomach, an oblong sac, which is rather muscular, but with somewhat thinner walls than those of the gullet, fig. 3, *c*. On the inner surface of the stomach occur too a number of folds, projecting into the cavity. The gullet and the stomach, which are of a uniform brownish-red, were both empty. At the point where the stomach opens into the intestine is seen a constriction. The intestine immediately strikes off to the left, and then makes a bend, proceeding backwards, and almost horizontally along the ventral surface, to the posterior third of the perivisceral cavity, fig. 3, *d*: here it makes another bend, taking a forward and oblique course to the right, almost in a plane with the first convolution, fig. 3, *e*, a few ligaments of connective tissue now connecting it with the stomach, fig. 3, *f*: here it bends anew, and obliquely backwards, fig. 3, *g*, continuing in that direction till, at the commencement of the posterior third of the perivisceral cavity, it forms a kind of knee, proceeding, when arrived at the

som svarer til Synaptidernes saakaldte Kloak, Fig. 3, *i*. Vi kunne vanskelig benævne denne Udvidning af Rectum Kloak, da vort Dyr ingen Tarmappendices (Lunger) har, ligesom der heller ikke aabne sig andre Organer i den udvidede Rectum. Denne er i hele sin Omkreds bundet til Kropsvæggen ved mange kortere og længere Muskeltraade, der tage deres Udspring fra Hudens Tvermuskler.

Tarmens Vægge ere meget tyndere, end Mavens; men tykkest ere de dog i Endetarmen. Tarmen er efter hele sin Længde bundet til Rygfladen ved et Mesenterium, ligesom der hist og her udgaar fra Bugfladens Tværmuskler enkelte lange Muskeltraade, der fæste sig paa Tarmen. I histologisk Henseende er Tarm, Mave og Svælg bygget som hos Holothuriderne i Almindelighed. Tarmkanalen, især Rectum, var udfyldt af en lerholdig Masse, hvori fandtes forskjellige Foraminiferer.

Kalkringen, det indre Skelet, er her ligesom hos Slægten *Elpidia* dannet af 5 Stykker, og ikke som sædvanligt hos Holothuriderne af 10. Disse 5 Stykker, der svare til Radialstykkerne, have megen Lighed med dem hos *Elpidia*. Ethvert Kalkstykke er sammensat af et Midtparti, der er temmelig massivt og danner en afstumpet Kegle med en lidt flad For- og Bagside, Fig. 14, *a*. Fra Midtpartiets Forflade udspringe 4 krumme Stave, Fig. 14, *b*, der ere sammenvoxede paa Midten, saaledes nemlig, at 2de Stave danne en temmelig spids Bue, og alle 4 tilsammen et X med meget krumme Arme, der ere bredest ved Udspringet, ere runde og ende knopformigt. Fra Midtpartiets Sideflader, noget bagtil, udspringe ligeledes 4 griffelformige Stave, 2 paa hver Side, hvoraf de to, der ere overordentlig lange, have en horizontal Retning, Fig. 14, *c*, imedens de to andre, der ere noget kortere, have en meget skjæv Stilling, Fig. 14, *d*. Disse 4 Stave, der i det Hele ere meget længere, end de forreste, ere ligeledes bredest ved Basis; deres Ender ere dels temmelig spidse, dels ere de kløftede. Det er de bagerste, lange horizontalt løbende Stave, der forene sig med de tilsvarende fra de tilgrændsende Kalkstykker, som væsentlig danne den femkantede Ring. Forbindelsen sker ved Bindevæv og paa den Maade, som Dr. Théel har paavist ved *Elpidia*.

Fra Kalkringen udbreder sig en yderst tynd Bindevævsmembran, som omgiver Spiserøret og fæster sig paa den bagerste Flade af Mundskiven, hvorved Svælgsinus dannes. Indenfor denne Membran sees en Mængde fine Bindevævstraade, der dels udgaa fra den ydre Flade af Svælget, dels fra Mundskiven, og som fæste sig paa Enderne af Kalkringens forreste Stave.

middle of the cavity, horizontally backwards to the anus, fig. 3, *h*. This horizontal part, which must be regarded as a rectum, exhibits a rather conspicuous expansion, analogous to the cloacum in the *Synaptidæ*, fig. 3, *i*. This, however, is hardly an appropriate term by which to designate the expanded rectum, the animal having no intestinal appendages (respiratory tubes) or other organs opening into it. The rectum is webbed round the whole of its circumference to the wall of the body, by a number of muscular filaments of different lengths, issuing from the transverse muscles of the integument.

The intestine has much thinner walls than the stomach; those of the rectum are however thickest. The intestine is connected by a mesentery throughout its entire length with the dorsal surface; here and there, too, divers long muscular filaments proceed from the transverse muscles of the ventral surface to the intestine. Histologically, the structure of the intestine, the stomach, and the gullet differs in no respect from that distinguishing those organs in other Holothurians. The intestinal canal — more especially the rectum — was distended with an argillaceous substance, in which were divers Foraminifera.

As in the genus *Elpidia*, the calcareous ring, or inner skeleton, is composed of 5 pieces, — not of 10, the dominant number in Holothurians. These 5 plates, corresponding to the radial laminæ, present considerable resemblance to those in *Elpidia*. Each of these calcareous segments has a medial segment, rather massive, presenting the appearance of an obtuse cone, with the anterior and posterior surfaces slightly depressed, fig. 14, *a*. From the anterior surface of the medial segment protend 4 curved rods, fig. 14, *b*, connate, in the middle, one with the other, each pair forming accordingly a rather pointed arch, and the 4 rods together an X-like figure, with round and exceedingly curvate arms, broadest at the point of origin, and terminating in a knob. From the lateral surfaces of the medial segment, a little posteriorly, protend likewise 4 styloid rods, 2 on either side; 2 of these rods, which are exceedingly long, extend horizontally, fig. 14, *c*; the position of the other two, which are somewhat shorter, being very oblique, fig. 14, *d*. These rods, too, which are much longer than the other 4, are thickest at the base; their extremities are in part acuminate and in part cleft. It is the posterior, long, horizontal rods, that unite with the corresponding rods from the adjacent calcareous segments, which principally constitute the pentagonal ring. The attachment is effected by bands of connective tissue, and in the way pointed out by Dr. Théel in his description of *Elpidia*.

From the calcareous ring extends an exceedingly thin membrane of connective tissue, enveloping the œsophagus, and connate with the posterior surface of the oral disk, whereby is formed the pharyngeal sinus. Beneath this membrane are seen numbers of slender filaments of connective tissue, proceeding — part from the outer surface of the gullet, and part from the oral disk — to the extremities of the anterior rods of the calcareous ring.

Vandkarringen danner en temmelig smal Kanal, der ligger strax bagenfor Kalkringen, og omgiver det indknebne Spiserør lidt foran det Sted, hvor dette gaar over i Maven, Fig. 3, *k*. Fra Ringkanalen udgaa 5 Kanaler, 3 paa Bugsiden og 2 paa Ryggen. De to af Bugkanalerne, der udløbe fra Siderne, dele sig hver i 3 Grene, hvoraf den største, der kan betragtes som Kanalens Fortsættelse, gaar til Siden, løber langs den indre Flade af Kropsvæggen lige-til den bagerste Ende og danner Længdekarret, hvoraf der altsaa er to, et paa hver Side af Bugen. De to andre Grene gaa til hver sin Tentakel, hvori de udbrede sig. Den tredie Bugkanal, ligesom Rygkanalerne afgive hver 2 Grene, en til hver sin Tentakel. Fra Længdekanalernes ydre Væg udgaar en Gren til hver Fod, og uden at kunne angive det med fuld Sikkerhed, forekom det os, som om der paa den indre Væg, især paa den bagerste Del af Længdekarret, fandtes Udbugtninger, der laa nedsænkede i Huden og kunne svare til Fodampullerne hos mange Holothurider, Noget som virkelig finder Sted hos *Elpidia* ifølge Dr. Théels Angivelser. Længdekanalerne ere ligesaa tykke som selve Vandkarringen, og deres indre Flade er cilierende ligesom dennes.

Den Poliske Blære er pæreformig, meget stor med en temmelig kort Stilk, der gaar som sædvanlig over i Vandkarringen paa Bugsiden, Fig. 3, *l*.

Stenkanalen er temmelig lang, smal og slangeformig; dens yderste Ende er afrundet og fastvoxet til Huden ved den ydre Rand af den venstre Rygmuskel, just paa det Sted, hvor Mundskiven gaar over i Kroppen. Strax indenfor den fastvoxede Ende sidder Madreporpladen, der danner en knopformig Forhøining paa Stenkanalen. Madreporpladen har en meneandrisk Overflade med Forhøininger og Fordybninger, og hvis Organisation ikke synes at afvige væsentlig fra Madreporpladen hos *Trochostoma*[1]. Fra Madreporpladen bugter Stenkanalen sig henimod Vandkarringen, hvor den udmunder paa Rygsiden ligeoverfor den Poliske Blæres Udmunding. Stenkanalen bestaar af et temmelig fast Bindevæv; men er uden Kalk.

Blodkarsystemet frembyder intet Særegent. Tarmens Rygkar begynder i den Forsnevring, som findes der, hvor Maven gaar over i Tarmen; det følger nu dennes Slyngninger lige ned til Rectum. Paa denne Vei afgiver det en Mængde Sidegrene til Tarmen, hvilke anastomosere med Bugkarrets Forgreninger, og danne derved Netudbredninger i Tarmenes Vægge. Desforuden afgiver det Grene til Mesenteriet og en temmelig stor Gren til Kjønsorganerne.

[1] Se Magazin for Naturvid. 24 Bind. Christiania 1878.

Immediately posterior to the calcareous ring, a rather narrow canal, forming the water-vascular ring, encircles the constricted œsophagus, a little in advance of the point where the latter opens into the stomach, fig. 3, *k*. From the annular canal branch off 5 canaliculated ramifications, 3 on the ventral and 2 on the dorsal surface. Two of the ventral canals, which issue from the sides, divide each into 3 branches, the largest of which may be regarded as the continuation of the annular canal; it takes a lateral direction, running along the inner surface of the wall of the body straight to the posterior extremity, and forms the longitudinal vessels, which accordingly are two in number, one on either side of the belly. The two other branches proceed each to a tentacle, in which they ramify. The third ventral canal and the two dorsal canals divide each into 2 branches, proceeding to as many tentacles. From the outer wall of the longitudinal canals a branch proceeds to every sucker; and it seemed to us, though we cannot give it as a fully determined character, that on the inner wall, and more especially on the posterior portion of the longitudinal vessel, were sinuous processes, embedded in the skin, analogus to the pedal ampullæ in many Holothurians, and which, according to Dr. Théel, do actually occur in *Elpidia*. The longitudinal canals are equal in thickness to the water-vascular ring itself, and their inner surface is, in common with that of the latter, furnished with vibratile cilia.

The Polian vesicle is pyriform, very large, and has a rather short stem, prolonged, as in other Holothurians, into the water-vascular ring on the ventral surface, fig. 3, *l*.

The sand-canal is rather long, narrow, and flexuous, its upper extremity being rounded, and connate with the skin at the outer margin of the left dorsal muscle, exactly where the oral disk passes into the body. Immediately beneath the connate extremity occurs the madreporic body, as a globular protuberance on the sand-canal. The madreporic plate has a meneandrian surface, exhibiting a succession of eminences and depressions; its structure does not appear to be essentially different from that of the madreporic plate in *Trochostoma*.[1] From the madreporic plate, the sand-canal winds on to the water-vascular ring, where it disembogues on the dorsal surface opposite to the outlet of the Polian vesicle. The sand-canal consists of rather firm connective tissue, but exhibits no traces of calcareous deposit.

The circulatory system is not distinguished by any peculiar feature. The dorsal vessel of the intestine has its origin in the constricted passage through which the stomach opens into the intestine, accompanying the convolutions of the latter down to the rectum. On its course it sends off numerous lateral branches to the intestine, which anastomose with the ramifications of the ventral vessel, forming reticulated vascular assemblages on the intestinal walls. Branches also proceed to the mesentery, and one rather large ramification strikes off to the generative organs.

[1] *Vide* Magazin for Naturvid. 24 Bind. Christiania 1878.

Bugkarret tager sit Udspring paa Tarmens Bugside, i Niveau med Rygkarret, er meget fint ved sit Udspring, tiltager i Tykkelse paa den anden (foranløbende) Slynge, Fig. 3, *n*, og afgiver en Mængde Sidegrene til Tarmen, der som tidligere nævnt forene sig med Rygkarforgreningerne.

Mavens Rygkar, der er tykkere end Tarmens, gaar fortil langs Mave og Svælg og bidrager til i Forening med Bugkarret at danne en Ring omkring Svælget, lige bag Vandkarringen. Det afgiver Sidegrene, som netformig udbrede sig paa Maven og Svælget, hvor de anastomosere med Bugkarrets Forgreninger. Bugkarret er omtrent dobbelt saa tykt som Rygkarret, Fig. 3, *m*, og afgiver lignende Grene, som dette. Mavens Bugkar synes at udspringe med mange smaa Grene fra Mavens bagerste Ende, hvor denne gaar over i Tarmen uden at have nogen direkte Forbindelse med Tarmens Bugkar.

Kjønsorganerne ere fæstede med et meget langt, fast og temmelig bredt Ligament til den dorsale Del af Mesenteriet, just paa det Sted, hvor Tarmen begynder, og bestaar af to Hovedstammer, der forene sig til en Stamme, som er bunden til det ovennævnte Ligament. Den ene Hovedstamme laa imellem Tarmbugtningen, uden at være bunden til denne, flotterede frit i Kropshulheden, og var den største, Fig. 3, *o;* den dannes af et rundt, hult Rør, hvorfra udgaa mange temmelig korte Grene, 4—6, der ere forsynede med Smaablærer, saaledes at altid Enden af Grenen er delt i to, Fig. 3, *p*. Den anden Hovedstamme er kortere og fattigere saavel paa Grene som paa Blærer, og var ved sin ydre Ende bundet til Kropsvæggen tæt ved Stenkanalens Befæstning ved en temmelig lang Bindevævstraad.

Efterat begge Stammer have forenet sig til en fælles Stamme, gaar denne slangeformigt og skjævt forover imod Stenkanalen, hvor den fæster sig til dennes Mesenterium, følger den et Stykke Vei, men skiller sig atter fra den for at munde ud noget bagenfor to af Rygtentaklerne, Fig. 2, *b*. Den fælles Udførselskanal er især paa den forreste Del, hvor den gaar langs Stenkanalen, meget fast og har en hvid glindsende Farve. Den indre Flade af Blærerne er beklædt med Celler, hvori Æg saaes i forskjellige Udviklingsstadier. Det er sandsynligt, at Kjønnet er adskilt, ligesom hos *Elpidia* og *Kolga;* det Exemplar, vi have havt til vor Raadighed, var en Hun; der var Intet, som tydede hen paa blandet Kjøn.

Nervesystemet afviger neppe fra hvad der er almindeligt for Holothuriderne. Vi have seet en Nervering, der er temmelig smal, som omgiver den forreste Del af Svælget strax bagenfor Mundskiven. Fra den udgik fine Grene til Svælget og Mundskiven, ligesom enkelte større Stammer gik over paa den indre Flade af Kropshuden imellem denne og Længdemusklerne (1 for hver Længdemuskel), uden at

The ventral vessel originates on the ventral surface of the intestine, in a plane with the dorsal vessel, is exceedingly slender at its commencement, increasing in thickness on the second convolution, fig. 3, *n*, and sending off numerous lateral branches to the intestine, which, as already stated, unite with the ramifications of the dorsal vessel.

The dorsal vessel of the stomach, which is thicker than that of the intestine, takes a forward course, passing along the stomach and the gullet, and contributes, together with the ventral vessel, in forming a ring round the gullet, immediately posterior to the water-vascular ring. It sends off a number of lateral branches, which spread over the stomach and the gullet as a vascular network, the ramifications anastomosing with those of the ventral vessel. The ventral vessel is almost as thick again as the dorsal vessel, fig. 3, *m*, and branches in a similar manner. The ventral vessel of the stomach would seem to have its origin in numerous branchlets proceeding from the posterior extremity of the stomach, where the latter opens into the intestine, without however being directly connected with the ventral vessel of the intestine.

The generative organs are attached to the dorsal portion of the mesentery by an exceedingly long, rather broad, and close-textured membranous ligament, at the exact point where the intestine commences, and consist of two trunk-like appendages, coalescing into one, which is webbed to the membranous ligament. One of these stems lay within the intestinal convolution, but was not attached to it, — floating freely in the perivisceral cavity; this was the largest, fig. 3, *o;* it consists of a tube, from which proceed numerous branchlets, from 4 to 6, furnished with vesicles, in such manner that the extremity is always furcate, fig. 3, *p*. The other Stem is shorter, and less abundantly provided alike with branchlets and vesicles; at its outer extremity it was connected with the wall of the body, close to the point of attachment of the sand-canal, by a rather long filament of connective tissue.

The common trunk produced by the junction of the two stems, winds obliquely forward to the sand-canal, with the mesentery of which it is connected, accompanies it a short distance, whereupon it strikes off, to disembogue a little posterior to two of the dorsal tentacles, fig. 2, *b*. The common excretory canal, more especially the anterior portion, which passes along the sand-canal, is exceedingly firm in texture, and of a lustrous white. The inner surface of the vesicles was clothed with cells, containing ova in divers stages of development. The sexes are most probably separate, as in *Elpidia* and *Kolga*. The specimen here described was a female; we could detect no feature suggestive of bisexual organisation.

The nervous system will hardly be found to differ from that in other Holothurians. We observed a nervous ring, rather slender, surrounding the anterior portion of the gullet, immediately posterior to the oral disk. From its outer margin a number of delicate ramifications proceeded to the gullet and the oral disk; and several larger branches were sent off to the inner surface of the

vi dog kunne forfølge disse i deres hele Løb. I Huden have vi forøvrigt ikke kunnet opdage Nerveforgreninger.

Findested.

Station 35. Kun et Exemplar.

Slægtskarakter.

Legemet næsten cylindrisk, bilateralt. Munden næsten central. Anus i den bagerste Ende. 10 korte, tykke, haandformig fligede Tentakler. Langs Kroppens Sider 9 Par lange, stive, ikke retraktile, hinanden modsatstaaende Fødder, og 6 lignende Fødder rundt Kroppens bagerste Ende. Paa Ryggen 2 Rækker Papiller, imellem hvilke to enkeltstaaende. I Huden Kalkspikler.

Myriotrochus Rinkii, St.

Tab. V.

1851. *Myriotrochus Rinkii*, St. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn. Pag. 55—60. Pl. 3, Fig. 7—10.

1857. *Myriotrochus Rinkii*, St. Lütken, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn. Pag. 21, 22.

1863. *Myriotrochus Rinkii*, St. Stimpson, Synopsis Marinæ Invertebrata. Arc. Exped. Proc. Acad. Nat. Sc. Philadelphia. Pag. 138.

1867. *Myriotrochus Rinkii*, St. Selenka, Zeitschrift f. w. Zoologie, Bd. 17, Pag. 367.

1867. *Myriotrochus Rinkii*, St. Semper, Reisen in Archipel der Philippinen. Holothuria 1. Pag. 24.

Professor Japetus Steenstrup er den første, som i videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn har leveret en Beskrivelse, ledsaget af Tegninger over *Myriotrochus Rinkii.* Senere har Dr. Lütken nærmere beskrevet Kalkringen, der kun i Forbigaaende var omtalt af Steenstrup, og de øvrige ovennævnte Forfattere have kun angivet den, uden at have underkastet den nogen særskilt Undersøgelse. Men hverken Steenstrup eller Lütken have iagttaget Dyret levende, hvilket vi have været sat istand til, og hvorfor vi ogsaa kunne føie Et og Andet til Steenstrups Beskrivelse.

Dr. H. Théel har i sine Notitser over nogle Holo-

integument of the body, between the latter and the longitudinal muscles (1 to each longitudinal muscle); we were however unable to trace them throughout the full extent of their course. Other nervous ramifications could not be detected in the skin.

Locality.

Station 35. One specimen only.

Generic Character.

Body almost cylindric, bilateral. The mouth nearly central. The anus placed at the posterior extremity. Ten short, thick, lobed tentacula; the lobes palmate. Along the sides of the trunk, placed opposite one to the other, 9 pairs of long, stiff, non-retractile suckers, and 6 suckers, similar in form and arrangement, round the posterior extremity. On the back, 2 rows of papillæ, and 2 isolated papillæ between the rows. Calcareous spiculæ in the skin.

Myriotrochus Rinkii, St.

Pl. V.

1851. *Myriotrochus Rinkii*, St. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn. Pag. 55—60. Pl. 3, Figs. 7—10.

1857. *Myriotrochus Rinkii*, St. Lütken, Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn. Pag. 21, 22.

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1867. *Myriotrochus Rinkii*, St. Semper, Reisen in Archipel der Philippinen. Holothuria 1. Pag. 24.

Professor Japetus Steenstrup was the first to describe and figure *Myriotrochus Rinkii* in "Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn." Subsequently, a detailed description was furnished by Dr. Lütken of the calcareous ring, to which Steenstrup had devoted a few words only, the other authors mentioned above having merely recorded the animal, without making it the subject of a special examination. But neither Steenstrup nor Lütken had before them a living specimen, which we were so fortunate as to obtain; and we are therefore enabled to supplement Professor Steenstrup's description with a few additional data.

Dr. H. Théel, in his Notes on divers Holothurians

thurier i det kariske Hav[1] omtalt *Myriotrochus Rinkii*, men da vi formene, at det er en anden Art, sandsynligvis Huxley's *Chirodota brevis*, han har havt for sig, og ikke *Rinkii*, hvilket vi senere skulle godtgjøre, saa have vi ikke optaget Théels *Myr. Rinkii* i Synonymien.

Myr. Rinkii, St.

(Fig. 1).

Legemet næsten cylindrisk, lidt mere hvælvet paa Rygsiden og lidt smalere mod den bagerste, afrundede Ende, hvor den runde Analaabning findes, — er 10^{mm} tykt og 60^{mm} langt, foruden Tentaklerne, der ere 4^{mm} lange. Disse ere 12 i Antal, ikke retraktile, forsynede med 4—6 Cirrer paa hver Side, foruden Midtcirren, der er den længste, Fig. 1. Mundaabningen rund, omgiven af en Vold. Huden er klar gjennemsigtig, saa at baade Muskulaturen (Tvær- og Længdemuskler), Kalkringen, Tarmkanalen og Generationsorganerne kunne tydelig sees.

Paa Ryggen iagttages mange Kalkhjul, der viser sig at være stilkede, saa at naar Dyret under Bevægelsen trækker sig noget sammen, rage Hjulene et godt Stykke udover Hudens Overflade. Paa Ryggen findes Hjulene i de to intermuskulære Felter, hvor der er omtrent 12 paa hver Kvadratmillimeter; de staa dog langtfra regelmæssigt, og ere midt paa Ryggen meget mere spredte, saa at der kommer neppe 10 paa hver Kvadratmillimeter. Paa Bugfladen derimod ere de saa overordentlig spredte, at det endog har sine store Vanskeligheder at opdage et og andet, og paa mange Exemplarer var det ikke muligt at iagttage et eneste Hjul.

Den bagerste Del af Tarmen (den sidste Slynge) har et temmelig lige Løb og udvider sig saagodtsom ikke, idet den ender i den runde Anus. Der er ingen Kloak, nogen rythmisk Udvidning af Analaabningen finder ikke Sted; denne aabnes kun, naar Excrementerne skulle udstødes. Tarmens indre Flade er beklædt med et Lag af temmelig storkjærnet, flimrende Cylinderepithel; Cellerne vare fyldte med et yderst finkornet Protoplasma. I Tarmindholdet findes hos de allerfleste (og vi have havt Anledning til at se en Mængde i levende Live) mange smaa, rødlige Planarier, der vare meget livlige i deres Bevægelser. Efterat de vare komne ud af Tarmen, vare Bevægelserne særdeles raske, og de levede meget godt i Søvandet.

Myriotrochus Rinkii har en svag brunligrød Farve paa Kroppen; Tentaklerne ere noget mørkere med en intens mørk, brunrød, lidt aflang Pigmentplet paa Cirrernes Spids.

[1] Note sur quelques Holothuries des mers de la Nouvelle Zemble par Hj. Théel. Upsala 1877.

inhabiting the Kara Sea,[1] mentions *Myriotrochus Rinkii*, but the animal he alludes to belonging, as we conceive, to another species, probably Huxley's *Chirodota brevis*, and not *Rinkii* — our reasons will be given in due course — we have not included Théel's *Myr. Rinkii* in the list of synonyms.

Myr. Rinkii, St.

(Fig. 1).

The body, which is almost cylindric, being but a trifle more convex on the dorsal surface, and somewhat slenderer at the posterior rounded extremity, where the circular anal aperture occurs, has a thickness of 10^{mm} and a length of 60^{mm}, exclusive of the tentacles, which are 4^{mm} long. The latter, 12 in number, are non-retractile, and furnished on either side with from 4 to 6 cirrhi, exclusive of the medial cirrhus, which is the longest, fig. 1. The oral aperture round, and surrounded by a ridge. The skin is in a high degree translucent, the muscles (transverse and longitudinal), the calcareous ring, the intestinal canal, and the generative organs being distinctly seen through it.

Disposed over the dorsal surface, are numbers of rotated calcareous corpuscles, which, being pedunculate, project some distance above the surface of the integument, when the animal, in moving, slightly contracts its body. On the back, these rotated corpuscles occur dispersed over two intermuscular spaces, about 12 to every square millimetre; their arrangement is however anything but regular, and in the middle of the dorsal region less close, scarcely 10 to every square millimetre. On the ventral surface, they are so scattered and so few in number that you find it difficult even to light on one here and there; nay, in many specimens not a single rotated corpuscle could be detected.

The posterior portion of the intestine (the last circumvolution) takes rather a straight course, and scarcely expands at all, terminating as it does in the round anal aperture. There is no cloacum, no rhythmic expansion of the anus, which does not open save for the discharge of the fæces. The inner surface of the intestine is clothed with a layer of ciliated nucleal epithelium, the cylindric cells being filled with an exceedingly fine granulous protoplasma. The contents of the intestine, in the great majority of individuals (and we have had opportunity of observing a very large number of living specimens), exhibits numerous small reddish *Planariæ*, moving about with great vivacity. Out of the intestine, in particular, their motions were very lively, and the sea-water did not affect them injuriously.

On the body, *Myriotrochus Rinkii* is of a pale brownish-red; the tentacles are somewhat darker, with a slightly ovate patch of deep browny-red on the points of the cirrhi.

[1] Note sur quelques Holothuries des mers de la Nouvelle Zemble, par Hj. Théel. Upsala 1877.

Omkring Munden har den en brunrød Ring. Dyret kryber paa Tentaklerne.

Hudens histologiske Bygning afviger ikke væsentlig fra Holothuridernes i Almindelighed. Den dannes af en fuldkommen gjennemsigtig og strukturløs Cuticula, Fig. 2, *a,* under hvilken et Lag Cylinderepithel, Fig. 2, *b,* der støder umiddelbart til et tykt, hyalint Bindevævslag, Fig. 2, *c,* hvortil Muskelhuden (Tvær- og Længdemuskler) er fæstet. Hele Kroppens indre Flade er beklædt med et flimrende Peritoneum.

Det hyaline Bindevæv er overordentlig rigt paa forskjelligtformede Legemer, der ere snart ovale med en eller to Udløbere, Fig. 2, *d,* snart ere de mere eller mindre forgrenede, saaledes at de lange fine Udløbere korrespondere med Grene fra andre lignende Celler, hvorved et fint Netværk oftere fremkommer, Fig. 2, *e.* Disse samtlige Celler have en Kjærne, der ikke er meget stor, og som er omgiven af et tyndt Lag Protoplasma.

En saadan Rigdom af forgrenede Bindevævslegemer have vi ikke tidligere stødt paa; vi vare i Begyndelsen tilbøielige til at antage dem for Nerveceller; men nærmere Undersøgelser bragte os fra denne Antagelse; thi de havde ikke Nervecellens egentlige Karakter; Kjernen var meget for liden og Protoplasmaindholdet for fattigt, og det var os ikke muligt at sætte dem i nogensomhelst Forbindelse med de Nervetraade, vi fandt i Huden. Dr. Théel har i sine Bemærkninger til *Myriotrochus* fundet lignende Legemer i Huden, som han antager for Nerveceller, men vi ere ikke langtfra at tro, at denne Antagelse hviler paa en Misforstaaelse.

I Bindevævslaget, indenfor Epithelet, men beklædt af dette, findes de tidligere omtalte Hjul Pleirede, Fig. 2, *f.* Med Hensyn til disse have vi kun lidet at føie til Steenstrup's Beskrivelse. Den Flade, der vender udad, er skaalformig fordybet, og Centrumet, hvorfra Radierne udgaa, danner en liden, rund, knopformig Fremstaaenhed, der er forsynet med smaa Pigge, Fig. 2, *g.* Det er til denne Del, at det Bindevævsbaand er fæstet, som danner Stilken. Radierne variere i Antal; det samme er Tilfældet med de paa Hjulperipherien anbragte Tapper, Fig. 2, *h,* eller Tænder, der altid ere tilstede i større Mængde, hvilket gjør, at de snart sidde imellem to Radier, snart lige paa dem. Den bredere Del af Tappen er paa sin ydre Flade forsynet med et afrundet Indsnit, Fig. 2, *i,* hvilket bidrager til at give Hjulets Peripheri en undulerende Form, saaledes som af Dr. Théel antydet.

Foruden Bindevævslegemerne findes hist og her i Corium et intens brunrødt Pigment, dels i Klumper, dels indesluttet i særegne Celler. Ringmusklerne ere ikke afbrudte af Længdemusklerne eller Nervestammerne, men gaa rundt Legemet og dække Radialnerverne, der altsaa ligge imellem dem og Huden.

Paa Kroppens indre Flade, op imod Kalkringen, findes en Mængde yderst smaa, fritstaaende Legemer, der have en noget forskjellig Form, men hvoraf Bladformen er den

Round the mouth it has a brown-red ring. The organs of motion are the tentacles, on which the animal creeps.

The histological structure of the skin does not differ essentially from that in other Holothurians. Underneath the cuticle, which is translucent and structureless, fig. 2, *a,* extends a layer of cylindric cellular epithelium, fig. 2, *b,* connate with a thick hyaline layer of connective tissue, fig. 2, *c,* webbed to the muscular integument (consisting of transverse and longitudinal muscles). The entire inner surface of the body is clothed with ciliated peritoneum.

The hyaline connective tissue has dispersed throughout it numbers of corpuscles, varying in form, some oval, with one or two prolations, fig. 2, *d,* some more or less branched, the long, slender ramifications corresponding with those from other similar cells, and thus frequently constituting an intricate network, fig. 2, *e.* The cells have all of them a nucleus, not very large, which is invested with a thin layer of protoplasma.

Such an abundance of ramifying corpuscles we have never before met with in the connective tissue; indeed, we were at first disposed to regard them as nervous cells; but on further examination, the falsity of this assumptive view soon became apparent; for these corpuscles have none of the characters peculiar to a nervous cell; the nucleus is much too small, the protoplasmatic contents are too meagre, and we failed to discover any connexion whatever with the nervous filaments observed in the skin. True, Dr. Théel, as appears from his notes on *Myriotrochus,* has observed similar corpuscles in the integument, which he takes to be nervous cells; but we are almost afraid he has been misled in putting forward such an assumption.

In the layer of connective tissue, underneath the epithelium, are imbedded the rotated calcareous corpuscles mentioned above, fig. 2, *f,* with regard to which we have but little to add to Professor Steenstrup's description. The exterior surface is calyx-shaped, and the central point from which the radii proceed constitutes a small, round, tubercular apophysis, furnished with minute spinules, fig. 2, *g.* It is to this part that the membranous ligament forming the stem is attached. The radii vary in number; the same, too, is the case with the cogs or teeth, fig. 2, *h,* on the periphery of the rotated corpuscles, which, being very numerous, occur sometimes between the radii, sometimes on them. The broad part of the cog, or tooth, has on its outer surface a rounded incision, fig. 2, *i,* which, as noticed by Dr. Théel, helps to give an undulary form to the periphery of the rotated corpuscle.

Exclusive of the corpuscles of connective tissue, occurs every here and there in the corium a deep brownish-red pigmentary substance, either in isolated lumps or deposited in peculiar cells. The annular muscles are not decussated by the longitudinal muscles or the nervous trunks, but encircle the body, covering the radial nerves, which extend accordingly between the annular muscles and the skin.

On the inner surface of the body, in close proximity to the calcareous ring, are seen numbers of exceedingly minute isolated corpuscles, varying somewhat in form, which,

hyppigste. De have en Længde fra 0.015—0.030^{mm}, ere fæstede til Peritoneum ved en Stilk, der udvider sig noget ved Tilheftningsstedet. Den frie Ende er som oftest bredere, og synes at have en elliptisk Aabning, Fig. 3. Disse Legemer have et kornet Indhold og svare til de, der ere beskrevne af Grube, Sars, Semper, Théel og Flere, hos Synaptiderne. Vi have kun undersøgt disse Legemer paa Spiritusexemplarer.

Stenkanalen, der er yderst kort, omtr. 0.8^{mm}, bestaar af en noget krumbøiet Sæk, der er udfyldt med et sammenhængende Kalknæt, der strækker sig noget ud paa Vandkarringen, just paa det Sted, hvor Stenkanalen udmunder, Fig. 4. — Endelig skulle vi bemærke, at paa Radialnerverne, lige ved deres Udspring fra Nerveringen, findes en Blære paa hver Side af Nervestammen; men disse Blærer indeholde ikke Otolither, og bestaa af en fast gjennemsigtig Membran, beklædt paa sin indre Flade med Epithel, aldeles tilsvarende det hos Dr. Théels Art.

Ifølge de Undersøgelser, vi have anstillet, staar det for os klart, at den Art, Théel har iagttaget og tildels beskrevet, ingenlunde er *Myriotrochus Rinkii,* men efter al Sandsynlighed er den samme som Huxley har beskrevet under Navnet *Chirodota brevis;* idetmindste antager Théel, at hans og Huxley's Art ere identiske, ligesom han formener, at dersom det konstateres, at den grønlandske Art stadig har stilkede Hjul, maa hans og Huxley's danne en fra *Rinkii* forskjellig Art.

Vore Exemplarer, hvoraf vi have en stor Mængde, ere fra Spitsbergen; de have alle stilkede Hjul, og svare forresten ganske til Steenstrup's og Lütken's Beskrivelser, ligesom vi ogsaa have havt et Originalexemplar til vor Disposition, saa vi kunne ikke være i Tvivl om, at det er den virkelige *Rinkii,* vi have undersøgt. Sammenholde vi nu vore Iagttagelser med de af Théel anstillede, saa fremgaar deraf, at Théels Art frembyder saamange Afvigelser fra *Myriotrochus Rinkii,* at den nødvendigvis maa danne en fra denne forskjellig Art.

however, in the great majority is petaloid. They measure in length from 0.015^{mm} to 0.030^{mm}, are affixed to the peritoneum by a stem, which slightly expands at the point of attachment. The free extremity is as a rule broadest, and furnished apparently with an elliptic opening, fig. 3. These corpuscles contain a granulary substance, and are the analogue of those met with in the *Synaptidæ,* described by Grube, Sars, Semper, Théel, and others. Save in spirit-specimens, we have not examined these corpuscles.

The sand-canal, which is exceedingly short, about 0.8^{mm} in length, has the form of a slightly arcuate sac, filled with a network of calcareous reticulations extending out on the water-vascular ring, to the exact point at which the canal disembogues, fig. 4. — In conclusion, we must not omit to observe, that the radial nerves, at their origin on the nervous ring, are furnished with a vesicle on either side of the nervous trunk; but these vesicles do not contain Otoliths; they consist of a close-textured transparent membrane, clothed on its inner surface with an epithelial layer, exactly as in Dr. Théel's species.

As the result of our investigation, we feel convinced, that the species observed and briefly described by Dr. Théel, cannot be *Myriotrochus Rinkii,* but is most probably identical with Huxley's *Chirodota brevis;* indeed, their specific identity is assumed by Dr. Théel himself, who opines that, in the event of the Greenland species invariably having the rotated corpuscles pedunculate, his and Huxley's must be regarded as specifically distinct from *Myr. Rinkii.*

Our specimens — we have a large number — are from Spitzbergen; they have all of them the rotated corpuscles pedunculate, and in other respects agree closely with Steenstrup's and Lütken's descriptions; moreover, we have had before us an original specimen, and hence there can assuredly be no doubt whatever that the subject of our examination was the true *Rinkii.* On comparing our observations with those of Dr. Théel, his species is found to differ in so many respects from *Myriotrochus Rinkii,* that it cannot but be regarded as specifically distinct.

Myriotrochus (Chirodota) brevis, Huxley.

1852. *Chirodota brevis,* Huxley. Journal of a voyage in Baffin's Bay and Barrow-Strait in the year 1850—51 by P. C. Sutherland; Vol. 11, Appendice, pages 221 et 222.

1865. *Oligotrochus vitreus,* M. Sars. Om arktiske Dyreformer i Christianiafjorden. Videnskabs-Selskabets Forhandlinger for 1865, Pag. 200. Fuldstændigere beskrevet og afbildet i Fauna littoralis Norvegiæ, 3die Hefte, Pag. 49.

1877. *Myriotrochus Rinkii,* Théel. Note sur quelques Holothuries des Mers de la Nouvelle Zemble. Upsala, 1877.

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1877. *Myriotrochus Rinkii,* Théel. Note sur quelques Holothuries des mers de la Nouvelle Zemble. Upsala, 1877.

Paa Expeditionen blev der kun fundet det ene Exemplar, som vi har havt til vor Undersøgelse. Paa dette Exemplar var Huden brusten, og endel af Tarmkanalen udfalden; men da Dyret var temmelig stort og godt conserveret, kunde Iagttagelserne dog anstilles med temmelig Nøiagtighed. Hvad vi nedenfor levere, er følgelig kun nogle Tillæg og Bemærkninger til Dr. Théels Afhandling over hans *Myriotrochus Rinkii;* thi det har destoværre ikke været os muligt at erholde Huxley's Arbeide over *Chirodota brevis.*

Legemet er cylindrisk, noget smalere i den bagerste Ende, 60^{mm} langt, 15^{mm} bredt paa det Tykkeste. Huden, der er glat, gjennemsigtig, saa de indre Dele sees, er fornemmelig paa Rygsiden besat med smaa Hjul, der som hvide, glindsende Punkter sees med blotte Øine. 12 fingerformig forgrenede Tentakler, der vel kan trækkes ind i deres egen Stilk, men ikke ind i Kroppen, saa at de ganske skjules.

Huden bestaar af en glasklar, strukturløs Overhud (Cuticula), der dækker Epithellaget, som dannes af Cylinderceller. Indenfor dette er et temmelig bredt Lag hyalint Bindevæv, hvori findes en stor Mængde forgrenede Bindevævslegemer, indeholdende en større eller mindre Kjerne, omgivet af Protoplasma, fuldkommen lig dem, som vi have omtalt hos *Myr. Rinkii*, Fig. 5, *a.* Udløberne korrespondere hyppig med hverandre, saa derved fremkommer et udbredt Netværk med store Masker. Denne Anordning af Bindevævslegemerne har ikke saa ganske lidet tilfælles med det saakaldte Slimvæv hos høiere Dyr.

Det hyaline Bindevæv gaar over i et tydeligt udpræget fibrillært, hvori Fibrene ligge lagvis, Fig. 5, *b, b,* med mellemliggende Lag hyalint Bindevæv, Fig. 5, *c, c.* Det er væsentlig i dette de ovenomtalte forgrenede Bindevævsceller findes; men de saaes ogsaa — dog meget sparsomt — i de fibrillære Lag. Disse danne tilsammen et næsten dobbelt saa bredt Belte, som det hyaline Bindevævslag. Det fibrillære Bindevæv støder umiddelbart til Ringmusklerne, der ikke afbrydes af Længdemusklerne eller Radialnerverne, men gaa rundt hele Kroppen.

De 5 Længdemuskler, der fortil fæste sig paa den udvendige hule Flade af Radialstykkernes Processer, og bagtil omkring Analaabningen, ere enkle og bundne til Ringmusklerne ved Bindevæv. Hele Muskellaget er beklædt af Peritoneum med et flimrende Epithelovertræk. Fra dette, især fortil ved Kalkringen, findes de af Théel omtalte Legemer, der rage frit ind i Kropshulheden. Foruden de af ham afbildede to Former findes der ogsaa flere andre, der nærme sig noget de af os nævnte hos *Myr.*

On the Expedition, one individual only was met with, which we have had submitted to us for examination. The skin of this specimen was cracked in places, and part of the intestinal canal had dropped out; the animal being however rather a fine specimen, and in a good state of preservation, comparatively accurate observations could notwithstanding be instituted. A few additional data, supplementary of Dr. Théel's Memoir on his *Myriotrochus Rinkii,* is therefore all we purpose furnishing here; for Professor Huxley's treatise on *Chirodota brevis* was unfortunately not to be had in any of our libraries.

The body is cylindric, a trifle slenderer at the posterior extremity, and measures 60^{mm} in length; its greatest thickness being 15^{mm}. The skin, which is smooth, and so transparent that the inner organs can be distinctly seen through it, exhibits, more especially on the dorsal surface, numerous small rotated corpuscles, visible to the naked eye as white, lustrous points. The animal is furnished with 12 digitated tentacula, which admit of being retracted within their own stem, but not into the body, so as wholly to conceal them.

The skin consists of a crystalline, structureless cuticle, covering the epithelial layer, which is composed of cylindric cells. Underneath the latter extends a rather broad layer of hyaline connective tissue, throughout which are dispersed large numbers of ramose corpuscles of connective tissue, each with a nucleus, varying in magnitude, surrounded by protoplasma, exactly similar to those we noticed in our description of *Myr. Rinkii,* fig. 5, *a.* The ramifications frequently correspond, each with each, thus forming an extensive large-meshed network. This arrangement of the corpuscles of connective tissue has not a little in common with the mucous tissue, as it is called, in animals of higher organization.

The hyaline connective tissue coalesces with another, exceedingly fibrillous, the fibrils being disposed in layers, fig. 5, *b, b,* with interjacent layers of hyaline connective tissue, fig. 5, *c, c.* It is chiefly the latter in which occur the ramose cells of connective tissue described above; but they were also observed — though in very limited numbers — in the fibrillous layers. These constitute together a membranous belt, nearly twice as broad as the hyaline layer of connective tissue. The fibrillous tissue is contiguous with the annular muscles, which are not intersected by the longitudinal muscles or by the radial nerves, but go right round the body.

The 5 longitudinal muscles, which, anteriorly, are attached to the outer hollowed surface of the processes issuing from the radial plates, and, posteriorly, to the margin of the anal opening, are simple, and webbed to the annular muscles by connective tissue. Over the whole of the muscular layer extends the peritoneum, invested with a ciliated epithelial tunic. Here, anteriorly in particular, near the calcareous ring, begin to occur the corpuscles noticed by Dr. Théel, which project freely into the peri-

Rinkii, og som kun maa betragtes som forskjellige Udviklingsstadier.

De af Théel særskilt beskrevne Celler, der findes paa de sphæriske eller ovale Legemer, og hvortil han tror at have fundet Nervegrene, ere efter vor Formening ikke andet end Epithelcellerne paa Peritoneum, der danner disse Legemers Overtræk, hvor de ere temmelig spredte.

I det hyaline Parti af Bindevævet, nærmest Epithellaget, ere Hjulene leirede. De findes især paa Rygfladen, hvor de ligge temmelig tæt til hverandre, naar Dyret er noget kontraheret; men spredes alt eftersom Kroppen udvider sig. Paa Bugfladen ere de yderst sparsomme og vanskelig at finde. Hjulenes Centraldel er paa den indre Flade forsynet med en rund Knop, Fig. 5; forresten ere de saa vel beskrevne af Dr. Théel, at vi kunne henvise dertil. De ligge flade i Huden, rage ikke over dennes Niveau, og ere ikke stilkede.

Dr. Théel beskriver et eget Slags Celler, der ligge i Grupper, næsten som Drueklaser paa enkelte Steder i Huden, saavel hos *M. brevis,* som hos *Trochoderma elegans;* ogsaa vi have seet lignende; men vi ere tilbøielige til at antage dem for koagulerede Celler af Kropsvædsken, der tilfældigvis ere komne ind i Huden. Saadanne agglomererede Celler træffer man afsat snart paa Hudens indre Flade, snart paa Tarmen, snart paa Mesenterium og de Bindevævstraade, der binder Tarmen til Huden, og ere stundom saa nøie fæstede til disse Dele, at man let kunde fristes til at antage dem for histologiske Elementer deraf.

De tolv Tentakler ere fuldstændig lig dem hos *M. Rinkii,* og som af os ere afbildede; kun have de nogle Cirrer mere end *Rinkii.*

Kalkringen, Fig. 6, *a,* er sammensat af 10 Stykker, der bærer 12 Spidser (Processer) paa den forreste Rand, saaledes nemlig, at ethvert af de to dorsale Radialstykker, der støde til det midterste dorsale Interradialstykke, er forsynet med to Processer, Fig. 6, *b, b,* ligesom Spidsen paa de to midterste ventrale Radialstykker er den længste, noget Sars har gjort opmærksom paa i hans Beskrivelse over *Oligotrochus vitreus.* I det Hele taget ligner Kalkringen hos denne fuldstændig den hos *M. brevis.*

Vandkarringen er som hos Synaptiderne i Almindelighed; den Poliske Blære er temmelig stor, ægformig, Fig. 6, *c.*

Stenkanalen er meget kort, den har næsten S-Formen, er meget bred indad hvor den munder ud i Vandkarringen, Fig. 6, *d,* 7, *d.* Paa dens ydre Ende, der ved et stærkt Ligament, Fig. 7, *a,* er bundet til Hudens indre Flade, findes en bred Madreporplade, Fig. 7, *b,* der er ujævn paa Overfladen af de fremragende Kalkpigge, og hvori den

visceral cavity. They assume, exclusive of the two forms he has figured, several others, bearing some resemblance to those of the spicules in *Myr. Rinkii,* and which must be regarded merely as representative of the divers stages of development.

The cells on the spherical or ovate corpuscles, specially described by Dr. Théel, and passing to which he believes to have detected nervous ramifications, are, in our opinion, simply the epithelial cells of the peritoneum, with which these corpuscles are invested when they occur comparatively dispersed.

In the hyaline portion of the connective tissue, immediately beneath the epithelial layer, are embedded the wheel-shaped spicules. They occur in particular on the dorsal surface, where they crowd together on a slight contraction of the body, again dispersing when it expands. On the ventral surface they are very sparingly distributed, nay are difficult even to detect. The central portion of the spicules is furnished on the inner surface with a round knob, fig. 5; for the rest, they have been so excellently described by Dr. Théel as to render further notice superfluous. They lie in a plane with the skin, never projecting above it, and are not pedunculate.

Dr. Théel also describes a peculiar kind of cells occurring both in *M. brevis* and *Trochoderma elegans;* they are arranged in groups, not unlike clusters of grapes, here and there in the skin. We, too, have observed similar cells, but are inclined to regard them rather as cellular globules of coagulated perivisceral fluid that have chanced to find their way into the skin. Such agglomerate cells are met with on the inner surface of the skin, on the intestine, on the mesentery, and on the membranous filaments that web the intestine to the skin; and they are so closely connected with those parts as to present every appearance of being histological elements.

The twelve tentacula are exactly similar to those of *M. Rinkii,* as figured by us, save in their having a few more cirrhi.

The calcareous ring, fig. 6, *a,* is composed of 10 segments (ossicles) and has on the anterior margin 12 acuminate processes, arranged in such manner that each of the two dorsal radial segments contiguous to the medial dorsal interradial segment is furnished with two processes, fig. 6, *b, b,* the process on each of the two medial ventral radial segments being the longest, a distinctive feature pointed out by Sars in his description of *Oligotrochus vitreus.* The general structure of the calcareous ring in this species is the same as in *M. brevis.*

The water-vascular ring as in other *Synaptidæ;* the Polian vesicle rather large, ovate, fig. 6, *c.*

The sand-canal very short, in form closely resembling the letter S; within, at the point where it opens into the water-vascular ring, exceedingly broad, fig. 6, *d,* 7, *d.* On its outer extremity, attached by a strong ligament, fig. 7, *a,* to the inner surface of the skin, occurs a broad madreporic body, fig. 7, *b,* and with this body, which the projecting

egentlige Kanal taber sig, Fig. 7, *c*. Stenkanalen dannes af en meget bred Bindevævsskede, hvori er afsat en Mængde Kalk; selve Kanalen bestaar af et fastere Bindevæv, der er uden Kalk.

Farven bleg rosenrød med brunlige Tentakelblade.
Stat. 270.

Med Hensyn til *Oligotrochus vitreus*, saa maa vi tilstaa, at vi i længere Tid have været i Tvivl om, hvorvidt den kunde opretholdes som særegen Slægt; men af Mangel paa tilstrækkeligt Sammenligningsmateriale maatte vi lade Afgjørelsen staa hen til en gunstigere Tid. Denne kom, idet vi fra Nordhavsexpeditionen blev forsynet med en stor Mængde Exemplarer af *Myriotrochus Rinkii* og et velkonserveret Exemplar af Huxley's *Myriotrochus (Chirodota) brevis*.

Vi tog nu fat paa at undersøge *Oligotrochus vitreus*, og fandt, at de Kjendetegn, der skulde karakterisere Slægten, faldt fuldstændig sammen med dem, der tilhøre *Myriotrochus*. Hjulene ere vistnok ikke stilkede; men paa de Exemplarer, vi have undersøgt, ere de tilstede i ligesaa stor Mængde som hos *Myriotrochus*. Ligesom Tilfældet er hos denne, at Bugfladen kan stundom være ganske fri for Hjul, og altid, naar de findes der, ere de yderst sparsomme, — saaledes forholder det sig ogsaa hos *Oligotrochus*.

Har altsaa Sars undersøgt mest Bugfladens Hud, saa lader det sig forklare, hvorledes det er gaaet til, at han har fundet saa faa Hjul. Denne Omstændighed i Forening med at Hjulene vare stilkløse, har motiveret Sars til at opstille en ny Slægt. Men, som vi have seet, har *M. brevis* heller ikke stilkede Hjul, hvilket Sars dengang ikke kjendte til. Selv vaklede han imellem at danne en ny Slægt, eller at henføre den til Steenstrup's *Myriotrochus*; men han bestemte sig til det Første. Vi have ikke fundet, hverken i de ydre eller i de anatomisk-histologiske Kjendetegn, Noget der kan adskille den fra *Myriotrochus*, og vi ere saaledes nødsagede til at inddrage Slægten *Oligotrochus*.

Hvad nu Arten angaar, saa falder den ganske sammen med *Myriotrochus brevis*. At Sars dengang antog den for at være forskjellig fra *Rinkii*, var jo i sin Orden, og da han ikke har kjendt Huxley's *Chirodota brevis*, saa faldt det af sig selv, at han gav den et nyt Navn. Men efter de Undersøgelser, vi have anstillet over *Oligotrochus vitreus*,

calcareous spicules give a rough surface, the canal itself coalesces, fig. 7, *c*. The sand-canal is enclosed in an exceedingly broad sheath of connective tissue, strengthened by an abundance of calcareous deposit; the canal itself consists of connective tissue, firm in texture but without calcareous deposit.

Colour a pale rosy red; the tentacular pinnæ brownish.
Station 270.

We must confess we have long felt very doubtful as to whether *Oligotrochus vitreus* would in the end be found to constitute a separate genus; but the materials before us being insufficient for pronouncing a decided opinion, we deemed it best to defer our judgment till a more favourable opportunity should enable us to institute conclusive observations. Nor did we wait in vain; for on the return of the North-Atlantic Expedition, numerous examples of *Myriotrochus Rinkii* and a well-preserved specimen of Huxley's *Myriotrochus (Chirodota) brevis* were submitted to us for examination.

We forthwith renewed our observations on *Oligotrochus vitreus*, and were not surprised to find, that the characters said to distinguish the genus do not in any respect differ from those of *Myriotrochus*. True, the wheel-shaped spicules are not pedunculate; but in the specimens we have examined they are as numerous as in *Myriotrochus*. And, as is the case with the latter, the ventral surface in *Oligotrochus* has sometimes not a trace of these spicules, which, when they do occur there, are always very sparingly distributed.

Supposing, then, that Sars confined his observations chiefly to the integument of the ventral surface, the fact of his having found so few wheel-shaped spicules is at once accounted for. It was this paucity of spicules in conjunction with their non-pedunculate character that induced Sars to establish a new genus. But neither are, as we have seen, the wheel-shaped spicules in *M. brevis* pedunculate, a feature of which Sars was at that time ignorant. Nay, he himself wavered between establishing a new species or referring the animal to Steenstrup's *Myriotrochus*; but the balance dipped in favour of the former alternative. Neither in the exterior nor in the anatomical-histological characters have we lighted on any generically distinctive feature which it does not share with *Myriotrochus*; and hence the genus *Oligotrochus* should, we opine, be no longer retained.

And as regards the species, it agrees in every respect with *Myriotrochus brevis*. In deeming it specifically distinct from *Rinkii*, Sars is found to have been quite correct, and as Huxley's *Chirodota brevis* was unknown to him, it was but natural he should give it a new name. But, according to our observations *Oligotrochus vitreus* and *Myriotrochus*

er Hudens Struktur og de i den indleirede Hjul fuldkommen lig dem hos *Myriotrochus brevis.* Kalkringen, Vandkarringen og Stenkanalen afvige heller ikke. Sars omtaler vel, at Stenkanalen er stilket og uden Kalk; men dette stemmer ikke overens med vore Iagttagelser. Vi fandt, at Stenkanalen hos *Oligotrochus vitreus* var aldeles lig den hos *Myriotrochus brevis,* og da vi kort iforveien have beskrevet denne, kunne vi henvise dertil. Nervesystemet hos *Oligotrochus vitreus* frembyder heller ingen Afvigelse fra *Myriotrochus brevis.* Radialnerverne ere forsynede med to saakaldte Høreblærer uden Otolither, hvilke sidde paa hver Side af Radialstammen, strax bagenfor dennes Udspring af Nerveringen.

Af det her anførte vil det formentlig erfares, at *Oligotrochus vitreus* er identisk med *Myriotrochus (Chirodota) brevis,* og det tør derfor erkjendes, at der for os har været fuld Grund til at opføre den i Synonymernes Række.

Acanthotrochus[1] **mirabilis,** n. g., n. sp.

Tab. V—VI. Fig. 8 og 8[1].

Legemet er 10—12^{mm} langt, cylindrisk, langstrakt, bredere og afrundet i den bagre Ende, noget smalere i den forreste og indkneben paa Midten. Huden fuldstændig glasklar, og i den sees yderst fine glindsende Punkter, der under Loupen viser sig at være Kalkhjul. 5 Længdemuskler. 12 fingerformige Tentakler.

Huden.

Indenfor den strukturløse Cuticula er Epithelet, der bestaar af et enkelt Lag Cylinderceller, Tab. V. Fig. 9, *a,* hvilket fæster sig til et bredere hyalint Bindevæv, Fig. 9, *b,* hvori sees hist og her enkelte Bindevævslegemer, der dels ere aflange, dels forsynede med en eller to Udløbere, Fig. 9, *c, c;* desforuden iagttages i det indre Lag, nærmest Muskelhuden, flere isolerede ovale, temmelig klare Celler, indeholdende Moleküler (Semper's Slimceller), Fig. 9, *d.* Der, hvor Epithelet støder til Læderhuden, findes en hel Del enkelte pæreformige Legemer, hvis bredere, afrundede Del er ligesom nedsænket i Corium, medens den smalere, stilkede, forlænger sig op imellem Epithelcellerne, Fig. 9, *e, e.* Disse Legemer, der ere 0.006^{mm} lange og 0.003^{mm} brede, bestaa af en tynd gjennemsigtig Membran, der

[1] ακανθα = en Pig og τροχός = et Hjul.

brevis agree in the structure of the skin and the wheel-shaped spicules embedded therein. Nor could we detect any difference in the calcareous ring, the water vascular ring and the sand-canal. True, the sand-canal, according to Sars, is pedunculate and without calcareous deposit; but this we did not find to be the case in the specimen examined. The sand-canal in *Oligotrochus vitreus* — we refer to our description of that organ — was exactly similar to that in *Myriotrochus brevis;* nor does the nervous system in the one exhibit any difference whatever from that in the other. The radial nerves are furnished with two auditory vesicles, as they are called, without Otoliths, one on either side of the radial stem, immediately posterior to its origin on the nervous ring.

From what has here been stated, it will, we cannot but think, be sufficiently clear, that *Oligotrochus vitreus* is identical with *Myriotrochus (Chirodota) brevis,* and must, therefore, be added to the list of synonyms.

Acanthotrochus[1] **mirabilis,** n. g., n. sp.

Pl. V—VI; figs. 8 and 8[1].

Body, measuring 10—12^{mm} in length, cylindric, elongate, the posterior extremity rounded and somewhat broader than the anterior; constricted in the middle. Skin crystalline, its surface dotted with minute lustrous points, which, examined under a lens, are found to be wheel-shaped spicules of characteristic form. Longitudinal muscles 5. Twelve digitated tentacula.

Skin.

Beneath the structureless cuticle extends the epithelium, consisting of a single layer of cylindric cells, Pl. V, fig. 9, *a,* webbed to a broad hyaline stratum, fig. 9, *b,* in which are seen here and there a few corpuscles of connective tissue, some of them oblong, some furnished with one or two offshoots, fig. 9, *c, c;* moreover, in the inner layer, next to the muscular integument, occur several isolated, oval, semi-translucent cells, containing molecules (Semper's mucous cells), fig. 9, *d.* Between the epithelium and the coriaceous integument are numerous isolated pyriform corpuscles, having their broader rounded part as it were embedded in the corium, the narrower, pedunculate portion protending upwards between the epithelial cells, fig. 9, *e, e.* These corpuscles, which measure

[1] ακανθα, a spike; τροχός, a wheel.

indeslutter en Kjærne, som er indhyllet i en kornet Masse.

Vi antage disse Legemer for encellede Slimkjertler. der har sin særskilte Udførselsgang, som løber imellem Epithelcellerne for at udmunde paa Kroppens Overflade. Flere af disse Kjertler vare tomme, og da saaes Kjærnen meget tydeligt.

Det hyaline Bindevævslag støder umiddelbart til Muskelhuden (Ring- og Længdemuskler).

Ringmusklerne, Fig. 9, *f*, gaa paa den forreste og bagerste Ende rundt Kroppen uden Afbrydelse, imedens de paa Midten af Legemet ere afbrudte af Radialnerverne og Længdemusklerne, og danne altsaa her Tværmuskler. Muskelbundterne ere temmelig brede og sammenbundne med et gjennemsigtigt Bindevæv. Ringmusklerne danne paa den bagerste Ende en stærk Sphincter, der omgiver Analaabningen.

Længdemusklerne ere fortil fæstede paa Radialstykkerne, strax bag Nerveudløbet, bagtil gaa de henimod Analaabningen, hvor de fæste sig paa selve Sphincter. idet enkelte Fibre udbrede sig paa denne. Muskelhuden er beklædt af Peritoneum med sit flimrende Epithel.

Fra Peritoneum udgaa paa den forreste Del af Kropshulheden mange yderst smaa Legemer af forskjellig Form, der hænge frit i Hulheden. Nogle ere korte, stilkløse, dels næsten kuglerunde, dels mere aflange og ere fra 0.009—0.012^{mm} lange og 0.005—0.009^{mm} brede, Tab. VI, Fig. 10; andre ere meget mere langstrakte, stilkede, tildels cylinderformede med en bladdannet Yderende, Fig. 11, og ere fra 0.034—0.069^{mm} lange og 0.003—0.004^{mm} brede. Alle disse Legemer bestaa af en tynd Hud, som beklædes af Epithel, hvis Celler ligge her meget spredte, Fig. 10, *a, a,* og ere de for Synaptiderne seregne Organer, hvis Function i lang Tid har været meget gaadefuld, og som endnu ikke er ganske opklaret.

Vore Undersøgelser af disse Organer ere foretagne paa Spiritusexemplarer, og kan forsaavidt være mangelfulde. Ved imidlertid at sammenligne dem med Leydigs, anstillede paa levende Exemplarer af *Synapta digitata,* og ved at sammenstille dem med Ludvigs Beskrivelse over "Vimpercellen" hos Comatulaerne, — ere vi komne til den Formening, at de som mere udviklede Flimmerorganer tjene til at sætte Kropsvædsken i end stærkere Bevægelse. Saavidt vore Undersøgelser strække, kunne vi med Bestemthed sige, at de ikke staa i Forbindelse med Kar, men ere fæstede ved Bindevæv til Kropsvæggen, og have en afsluttet Hulhed, hvilket er overensstemmende med Johannes Müllers og Sempers Iagttagelser.

I det hyaline Bindevæv ere to Slags Kalkhjul leirede rundt hele Kroppen, og det paa en saadan Maade, at de

0.006^{mm} in length and 0.003^{mm} in breadth, consist of a thin translucent membrane, investing a nucleus enveloped by a granulous substance.

We regard these corpuscles as unicellular mucous glands, furnished with an excretory duct extending between the epithelial cells and opening on the surface of the body. Several of these glands were empty, and the nucleus could in that case be distinctly seen.

The hyaline layer of connective tissue is connate with the muscular integument (annular and longitudinal muscles).

The annular muscles, fig. 9, *f*, encircle the body without interruption at the anterior and posterior extremities: in the middle, however, they are intersected by the radial nerves and longitudinal muscles, forming here accordingly transverse muscles. The muscular fascicles are rather broad and webbed together by transparent connective tissue. At the posterior extremity, the annular muscles unite to form a powerful sphincter, surrounding the anal aperture.

Anteriorly, the longitudinal muscles are attached to the radial segments of the calcareous ring, immediately posterior to the point at which the nerves originate; posteriorly, they proceed to the anal aperture, where they are attached to the sphincter, over which several of their fibres extend. The muscular membrane is covered by the peritoneum with its vibratile epithelial layer.

From the peritoneum, on the anterior portion of the perivisceral cavity, extend numerous exceedingly minute corpuscles of divers forms, which project freely in the said cavity. Some of these corpuscles, measuring from 0.009^{mm} to 0.012^{mm} in length, and from 0.005^{mm} to 0.009^{mm} in breadth, Pl. VI, fig. 10, are short, non-pedunculate, and in form either almost globular or more or less oval; others, measuring from 0.034^{mm} to 0.069^{mm} in length, and from 0.003^{mm} to 0.004^{mm} in breadth, fig. 11, are much more elongate, pedunculate, and in part cylindric with a foliaceous extremity. All these corpuscles consist of a thin membrane, covered with epithelium, in which the cells lie far apart, fig. 10, *a, a,* and constitute organs peculiar to the *Synaptidæ,* whose function was long a puzzle to zoologists, and the nature of which is not yet satisfactorily determined.

Unfortunately, we have had none but spirit-specimens in which to examine these organs; but, on comparing our results with those of Leydig, from observations instituted on living examples of *Synapta digitata,* and with Ludvig's description of the "vimper cell" in the *Comatulæ,* we are decidedly of opinion that, as vibratile organs in a more advanced stage of development, these cells serve to give increased rapidity of motion to the fluid circulating in the perivisceral cavity. Assuming our observations to be correct, we can safely affirm, that the organs in question have no connexion whatever with any kind of vessels, being attached by a membrane to the wall of the body, and having a cavity, which is borne out by Müller's and Semper's investigations.

Round the whole of the body two kinds of wheel-shaped spicules are embedded in the hyaline connective tissue,

synes at være ligeligt fordelte overalt, naar Dyret lever og er i fuld Vigør, Fig. 12. De ligge, naar Kroppen er udspændt, et ganske lidet Stykke fra hverandre, men nærme sig under Kontraktionerne; er Huden stærkt sammentrukken, hvilket i Regelen er Tilfældet, naar Dyret har været opbevaret i Spiritus, saa ligge Hjulene lagvis paa hverandre; Huden faar da et sølvglindsende Udseende og føles haard.

De store Hjul, Fig. 12, *a*, ere i størst Mængde tilstede, ere sammensatte af en Centraldel, der er flad, glat, og hvorfra udgaa Radier, hvis Antal varierer noget fra 8—11; men hyppigst er der dog 8. Disse Radier have en vingeformig Udvidning, Fig. 13, *a*, der er bredest paa Midten, hvorved de trekantede Mellemrum blive betydelig indknebne i den indre Halvdel, Fig. 13, *b*. Peripherien er sammensat af saamange Stykker, som der er Radier, og fra hvert saadant Stykkes ydre Rand udgaar en lang Tand, der er bred ved sit Udspring, men ender temmelig spids, Fig. 13, *c*. Tanden har en Retning udad og nedad. Hjulets Peripheri er saaledes besat med et Antal Tænder, der svarer til Radiernes Antal, og disse Tænder vende indad i Huden. Hjulet er paa Grund af Tændernes Stilling konkavt paa dets indre Flade, imedens dets ydre er plan. Disse Hjul variere lidt i Størrelse; saaledes er Tverdiameteren fra Peripheriens ydre Rand paa den ene Side til det tilsvarende Punkt paa den anden Side fra 0.220—0.290^{mm}; Tverdiameteren med Tænderne udgjør fra 0.320—0.350^{mm}. Tændernes Længde 0.080^{mm}.

De smaa Hjul ligge hist og her spredte imellem de store, Fig. 12, og ere meget forskjellige fra disse. De sidde paa en kort Stilk, lig dem hos *Myriotrochus Rinkii*. Centraldelen (Umbonen) er saagodtsom plan, men har en rund Knop paa Midten, hvortil Stilken er fæstet, Fig. 14. Fra Centrum udgaa i Regelen 11 Straaler, der ligeledes har en vingeformig Udvidning, Fig. 14, *a*, der ikke er saa bred, som paa de store Hjul, men som er tilstrækkelig til at give Mellemrummene et eget Udseende, Fig. 14, *b*. Hjulets Peripheri bestaar af ligesaa mange Stykker, som Radiernes Antal udgjør. Fra hvert Stykkes indre Rand udgaa i Regelen 2 korte, trekantede Tænder, Fig. 14, *c*. Disse Hjul ligne meget Kalkhjulene hos *Myriotrochus Rinkii;* men Forskjellen er dog iøinespringende, idet Radierne ere noget anderledes byggede, og Tænderne ere baade kortere og i omtrent dobbelt saa stort Antal tilstede som hos *Rinkii;* hos begge er den ydre Flade skaalformig. Ogsaa disse Hjul variere noget i Størrelse, fra 0.071—0.098^{mm} i Tversnit. Tænderne ere 0.013^{mm} lange. Hos *Myriotrochus* vare Hjulene 0.233^{mm} i Tversnit; Tænderne 0.049^{mm} lange.

and in such manner as, it would seem, to be equally distributed, so long as the animal is alive and in a perfectly healthy state, fig. 12. When the body is expanded, a minute space intervenes between them, but on its contraction, they approximate; if the skin is much shrunk, which is generally the case after the animal has been preserved some time in spirits, these spicules lie one above the other in layers; the skin then acquires a glittering, argenteous appearance, and is hard to the touch.

The large wheel-shaped spicules, fig. 12, *a*, are the most numerous; they consist of a central portion, which is flat, smooth, and from which issue radii, varying in number from 8 to 11; most frequently, however, there are 8. These radii, or spokes, have a pinnated expansion, fig. 13, *a*, broadest in the middle, and thus reducing in extent the inner half of the triangular interstices, fig. 13, *b*. The periphery is composed of as many segments as there are radii, and from the outer margin of each segment projects a long denticle, broad at its origin, but terminating in a comparatively sharp point, fig. 13, *c*. The denticles are directed outwards and downwards. The periphery has accordingly a number of denticles corresponding with the number of its radii, and these denticles extend inwards into the skin. From the position of the denticles, the inner surface of the spicule is concave; the outer surface is plane. These large wheel-shaped spicules vary somewhat in size; the transverse diameter, measured from the outer margin of the periphery on one side to the corresponding point on the other, is from 0.220^{mm} to 0.290^{mm}; the transverse diameter, including the denticles, ranges from 0.320^{mm} to 0.350^{mm}. The length of the denticles is 0.080^{mm}.

The small wheel-shaped spicules lie scattered here and there among the large ones, fig. 12, from which they differ materially in form. They are attached to a short stem, as in *Myriotrochus Rinkii*. The central portion (umbo) is almost flat, but furnished in the middle with a round knob, to which the stem is webbed, fig. 14. From the centre proceed, as a rule, 11 rays, likewise with pinnate expansions, fig. 14, *a*, not so broad as that in the large spicules, but of sufficient size to change the appearance of the interstices, fig. 14, *b*. The periphery of the spicules consists of as many segments as there are radii. From the inner margin of each segment project as a rule 2 short triangular denticles, fig. 14, *c*. These spicules present considerable resemblance to the wheel-shaped spicules in *Myriotrochus Rinkii*, but are readily distinguished from the latter, having a somewhat different structure; the denticles, too, are shorter, and their number about twice as great as in *Rinkii;* in both species the outer surface is cup-shaped. These smaller spicules, too, vary somewhat in size, their transverse diameter ranging from 0.071^{mm} to 0.098^{mm}. The denticles measure 0.013^{mm} in length. In *Myriotrochus*, the transverse diameter of the spicules was 0.233^{mm}, the length of the denticles 0.049^{mm}.

Fordøielsesorganerne.

Mundaabningen, der er rund og findes paa Midten af Mundskiven, er omgiven af en Sphincter og fører ind til Svælget igjennem Atriet. Svælget er kort, cylindrisk, temmelig muskuløst og har paa den indre Flade fremspringende Længdefolder. Hvor Svælget gaar over i Maven er en ringe Forengelse, men selve Mavesækken er ikke synderlig videre end Svælget, kun er dens forskjellige Hudlag noget tyndere.

Tarmen har som sædvanligt 3 Bøininger, der ved Mesenterier ere fæstede saavel til Ryg- som Bugfladen, og gaar over i en lige Rectum, Fig. 8[1], der ved mange muskuløse Baand er bunden til Kropsvæggen og ender i den runde Anus. Nogen Kloak findes ikke. Tarmens histologiske Sammensætning frembyder intet synderligt Afvigende fra hvad der er almindeligt for Holothuriderne. Den var stærkt udfyldt af Biloculiner.

Det indre Skelet.

Kalkringen er meget fin, 1mm i Gjennemsnit, og dannes af 10 Stykker, 5 Radial- og 5 Interradialstykker, der ere sammenbundne med et tyndt Bindevæv, Fig. 15. Hvert Stykke bestaar af Legemet (Corpus), Fig. 16, *a*, og den forlængede Del (Processus), Fig. 16, *b*.

Radialstykkernes ydre Flade er paa Midten forsynet med en Længdefure, Fig. 15, *a*, 16, *c*; deres indre Flade er lidt konkav, den bagerste Rand har et lidet Indsnit, som, idet det forener sig med det tilsvarende Interradialstykkes bagerste Rand, der har et lignende Indsnit, bliver halvmaaneformigt, Fig. 16, *d*.

Paa Ringens bagerste Rand findes altsaa 10 saadanne halvmaaneformige Indsnit, der ere afbrudte ved 10 Par yderst smaa Fremstaaenheder, Fig. 16, *e*, *e*. Fra to af Radialstykkernes forreste Rand udgaa to Processer, Fig. 15, *b*, *b*; fra de øvrige 3 udgaar kun en Proces, Fig. 15, *c*. De 3 Radialstykker, der hver bærer en Proces, tilhører Bugfladen, og disse Processer ere meget lange. De to, der hver bærer to Processer, hvoraf den ene er længere end den anden, tilhører Rygfladen, ere placerede en paa hver Side af et Interradialstykke, Fig. 15, *d*, der danner Ryggens egentlige Midte og findes imellem de to dorsale Længdemuskler. Hvor Processen udspringer fra Radialstykkets Legeme, der findes et lille Hul til Gjennemgang for Radialnerven, og lige bag dette inserer Radialmusklen sig.

Interradialstykkerne ere lidt convexe paa deres ydre, lidt konkave paa deres indre Flade. Fra deres forreste Rand udspringer fra ethvert af dem en Proces, der er meget mindre end de paa Radialstykkerne, naar undtages det midterste ventrale Interradialstykke, der har den længste Proces af alle, Fig. 15, *c*.

Naar Kalkringen er sammenbunden, udspringer altsaa

Digestive Organs.

The oral aperture, which is circular and located in the middle of the oral disk, is surrounded by a sphincter, opening into the œsophagus through the atrium. The œsophagus is short, cylindric, and rather muscular, with projecting longitudinal folds on its inner surface. Where the œsophagus opens into the stomach, there is a slight constriction, but the ventral sac is but little wider than the œsophagus; the various tegumentary layers composing its skin are, however, somewhat thinner.

The convolutions of the intestine are, as usual, 3 in number, attached by mesenteries to the dorsal and ventral surfaces, and open into a straight rectum, fig. 8[1], webbed by numerous muscular bands to the wall of the body, and terminating in the circular anus. There is no cloacum. The histological composition of the intestine does not differ materially from that in other Holothurians. The intestine of the specimen examined was full of *Biloculinæ*.

The Calcareous Skeleton.

The calcareous ring is exceedingly minute, measuring not more than 1mm in diameter. It is composed of 10 segments, 5 radial and 5 interradial, webbed together by thin connective tissue, fig. 15. Each segment consists of a body (corpus), fig. 16, *a*, and an elongated portion, or process, fig. 16, *b*.

The outer surface of the radial segments is furnished in the middle with a longitudinal groove, fig. 15, *a*; 16, *c*; the inner surface is slightly concave, and its posterior margin has a slight incision, which, on uniting with a similar incision in the posterior margin of the corresponding interradial segment, acquires a lunate appearance, fig. 16, *d*.

The posterior margin of the ring has accordingly 10 of these lunate incisions, and in the space between these incisions occur 10 pairs of exceedingly minute protuberances, fig. 16, *e*, *e*. From the anterior margin of two of the radial segments issue two processes, fig. 15, *b*, *b*; from the remaining 3, but one, fig. 15, *c*. The 3 radial segments with one process each belong to the ventral surface, and these processes are very long. The 2 pieces with 2 processes each, of unequal length, belong to the dorsal surface; they are placed one on either side of an interradial segment, fig. 15, *d*, which constitutes the central portion of the back and occupies the space between the two dorsal longitudinal muscles. At the point where the process springs from the body of the radial segment, is seen a small aperture, for the passage of the radial nerve, and immediately posterior to this orifice, is inserted the radial muscle.

The outer surface of the interradial segments is slightly convex, the inner slightly concave. From the anterior margin of each issues a process much smaller than are those on the radial segments, saving that springing from the middlemost ventral interradial segment, which is the longest of all the processes, fig. 15, *c*.

From the anterior margin of the calcareous ring,

fra dens forreste Rand 12 Processer, der have en Retning indad og fortil; de ere alle brede ved deres Grund og ende meget spidst, Fig. 15. Imellem disse Processer findes ligesaa mange temmelig dybe halvmaaneformige Indsnit, der optage Tentaklerne, Fig. 15, *e*.

At de ventrale Stykker af Kalkringen ere større og have længere Processer, end de dorsale, er noget *Acanthotrochus* har tilfælles med Slægten *Myriotrochus*, og hvorved Kalkringen hos samtlige ere høiere paa Ventral- end paa Dorsalfladen.

Vandkarsystemet.

Vandkarringen ligger bagenfor og indenfor Kalkringen; dens Hinder ere tynde og gjennemsigtige og ere beklædte udvendig af det flimrende Peritoneum. Den er noget aflang, saaledes nemlig, at den gjør en stump Vinkel paa Bugsiden.

Fra Vandkarringen udgaar 10 Tentakelkar, 7 paa Dorsalfladen og Sidefladerne, 3 paa Bugfladen. Den midterste af disse forbliver udelt; de to øvrige dele sig hver i 2 Grene, der gaa til hver sin Tentakel.

Den Poliske Blære er aflang og har en meget kort Stilk; den gaar over i Vandkarringen paa venstre Side af denne tæt ved Udspringet af det venstre ventrale Tentakelkar.

Stenkanalen bestaar af en stilket, pæreformig Sæk, Fig. 17, i hvis temmelig faste, membranøse Vægge iagttages overalt Kalkfletninger, Fig. 18. Den blinde afrundede Ende er fri; den lange stilkede Del munder ud i Vandkarringen paa dennes høire dorsale Side. Sækkens Lumen indeholdt en klar Vædske. Vi have kaldt dette Organ Stenkanal, omendskjønt det i morphologisk Henseende afviger noget fra Stenkanalen hos Echinodermerne i Almindelighed; men der kan ingen Tvivl være om, at det i functionel Henseende har den samme Betydning. Fra Vandkarringens forreste Rand udgaar en tynd Membran, der gaar op og fæster sig paa Mundskivens Underflade, hvorved Svælgsinus dannes.

Tentaklerne ere korte: Skaftet omtrent 1^{mm} langt, cylindrisk og gjennemskinnende, saa at Hulheden tydelig kan sees, Fig. 19. Bladet er ikke fuldt saa langt som Skaftet, er haandformigt med 3 tilspidsede Lapper eller Grene, hvoraf den midterste er den længste, Fig. 19, *b*, og begge Sidelapperne have et dybt Indsnit, Fig. 19, *c*. Hverken i Tentaklerne eller Mundskiven findes Kalk.

Blodkarsystemet afviger ikke fra Holothuridernes i Almindelighed: kun saa vi ingen Anastomoser imellem Tarmkarrene paa de forskjellige Tarmslynger, hvilket ellers saa hyppigt forekommer.

when the parts composing it are in position, issue, accordingly, 12 processes, directed inwards and forwards; they are all of them broad at the base, and terminate in a sharp point, fig. 15. Between these processes there are an equal number of rather deep lunate incisions, for the reception of the tentacles, fig. 15, *e*.

The greater size and length of the processes issuing from the ventral segments of the calcareous ring, as compared with those springing from the dorsal pieces, is a feature shared by *Acanthotrochus* with the genus *Myriotrochus*, and which gives greater height to the calcareous ring on the ventral than on the dorsal surface.

Aquiferous System.

The water-vascular ring is located posterior to and within the calcareous ring; the membranes composing it are thin and transparent, and covered externally by the vibratile peritoneum. In form it is somewhat oval, so far at least as to form an obtuse angle on the ventral side.

From the water-vascular ring proceed 10 tentacular vessels, 7 on the dorsal surface and the lateral surfaces, and 3 on the ventral surface; that in the middle (on the ventral surface) is not divided, the remaining two have each two branches, proceeding to as many tentacles.

The Polian vesicle is oval, and has a very short stem; it passes into the water-vascular ring on its left side, in immediate proximity to the origin of the left ventral tentacular vessel.

The sand-canal consists of a pedunculate, pyriform sac, fig. 17, with rather firm, membranous walls, in which calcareous reticulations are everywhere observed, fig. 18. The cæcal rounded extremity is free; the long pedicled portion opens into the water-vascular ring on its right dorsal side. The lumen of the sac contains a clear fluid. We have called this organ the sand-canal, though differing morphologically to a slight extent from the sand-canal in most other Echinoderms; but there cannot, however, be the slightest doubt that its functional character is precisely the same. From the anterior margin of the water-vascular ring proceeds a thin membrane, extending up on the under surface of the oral disk, to which it is webbed, thus forming the pharyngeal sinus.

The tentacles are short; the shaft, measuring about 1^{mm} in length, is cylindric and transparent, so that the cavity can be distinctly seen, fig. 19. The palm is not quite so long; it is pinnate, with 3 acuminate lappets, the middle one being the longest, fig. 19, *b*; both the lateral lappets have a deep incision, fig. 19, *c*. Neither in the tentacles nor in the oral disk is there any trace of calcareous deposit.

The circulatory system does not differ from that commonly characteristic of Holothurians, we failed, however, to detect any anastomoses between the intestinal vessels on the several convolutions of the intestine, a feature so frequently observed in other species.

Nervesystemet.

Nerveringen omgiver den øverste Del af Svælget, er uregelmæssig rund, temmelig smal og er indesluttet i en Skede (Nervekarret). Den har en temmelig stærk gul Farve, og har et ydre Cellelag og et indre Fiberlag. Foruden en Mængde mindre Grene, som afgives til Spiserøret, Tentaklerne og Mundskiven, udgaa 5 Hovedstammer (Radialstammer) fra den. Disse gaa ud igjennem det lille Hul, som findes paa hvert af Kalkringens Radialstykker, og naar de komme paa den ydre Flade af dem, løbe de over Radialmusklen hen til Huden, hvor de fortsætte sit Løb imellem denne og Ringmusklerne til omtrent Midten af Kroppen, hvor de kun dækkes af Længdemusklerne, idet, som tidligere bemærket, Ringmusklerne her ophøre noget indenfor Længdemusklens Rand uden at gaa over Radialnerven. Længere bag paa Kroppen indtræder atter det tidligere Forhold, og nu er Radialnerven dækket af baade Ring- og Længdemuskelen lige til Analaabningen. Der hvor Radialnerven træder ind i Kalkringens Radialstykke, findes paa hver Side af den en rund klar Blære, der dannes af en temmelig fast, gjennemsigtig Membran, hvis Indhold var en klar Vædske uden Otolither. Disse Blærer svare til de saakaldte Høreorganer, der findes i større og mindre Mængde hos Elpididerne, og som baade Dr. Théel og vi tidligere have paavist, — kun er Forskjellen den, at de hos *Acanthotrochus* ingen Otolither have, hvilket, ifølge Théels Angivelser, ogsaa skal være Tilfældet hos den af ham beskrevne *Trochoderma elegans*. Er dette et mere primitivt Stadium af Høreorganet, eller skulde det tyde hen paa, at disse Blærer ingenlunde ere specielle Sandseorganer?

Radialnerverne ere indesluttede i et forholdsvis vidt Kar, der paa Nervens indre Flade er sammenvoxet med denne, Tab. V, Fig. 9, *g*, medens Karret paa den ydre Side er aabent, Fig. 9, *h*. Dette Forhold er ganske modsat af det Dr. Teuscher angiver at være Tilfældet hos Crinoiderne, Echiniderne og Holothuriderne, hvor Radialnerven med sin ydre, brede Flade er sammenvoxet med Karvæggen. Om Karret er forsynet med Endothelceller skulle vi ikke med Sikkerhed kunne afgjøre; thi det var os ikke muligt, selv under meget stærk Forstørrelse, at opdage saadanne. Selve Nervestammen bestod af et lysere, bredere Lag, Fig. 9, *i*, og et mørkt smalere, Fig. 9, *k*, der vendte indad og var sammensmeltet med Karvæggen. Nerven bestod af et peripherisk Cellelag og et centralt Fiberlag. Fra Radialnerverne udgik langs hele Løbet en Mængde Grene til Musklerne og Huden.

Generationsorganerne.

De faa Exemplarer (4), vi have havt til vore Undersøgelser, vare samtlige Hunner. Kjønsorganet hos Hunnen

Nervous System.

The nervous ring surrounds the upper portion of the œsophagus; it has a somewhat irregular circular form, is rather narrow, and is enclosed in a membranous sheath (the nervous vessel). It has a rather deep yellow colour, and is furnished with an outer cellular layer and an inner fibrous layer. Exclusive of numerous smaller ramifications passing to the œsophagus, the tentacles, and the oral disk, 5 large stems (the radial stems) proceed from the outer margin of the ring. These stems project through the small aperture on each of the radial segments composing the calcareous ring; and after reaching their outer surface, they extend across the radial muscle to the integument, from whence they continue their course between the latter and the annular muscles nearly to the middle of the body, where they are covered by the longitudinal muscles alone, the annular muscles, as before stated, terminating here a little within the margin of the longitudinal muscle, without crossing the radial nerve. Farther down the body, the radial nerves are covered both by the annular and the longitudinal muscles till they reache the anal opening. Where the radial nerve pierces the radial segment of the calcareous ring, on either side of the nervous stem, is seen a round, bright vesicle, consisting of a firm, transparent membrane; they contained each a limpid fluid, without Otoliths. These vesicles correspond to the so-called auditory organs that occur — more or less numerous — in the *Elpididæ*, and to which attention has been previously called both by Dr. Théel and by ourselves, — with this difference, however, that in *Acanthotrochus* they have no Otoliths, which, according to Dr. Théel's description of *Trochoderma elegans*, is also the case with that species. Does this characteristic feature represent an earlier stage in the development of the auditory organ, or are we rather to infer, that these vesicles have no sensorial function whatever?

The radial nerves are enclosed in a comparatively capacious vessel, which, on the inner surface of the nerve, is connate with the latter, Pl. V, fig. 9, *g*, and open on the outer surface, fig. 9, *h*. This feature is exactly the reverse of that stated by Dr. Teuscher as characteristic of the *Crinoidea*, *Echinoidea*, and *Holothuroidea*, in which the outer broad surface of the radial nerve is connate with the wall of the vessel. Whether the vessel be furnished with endothelial cells, is a question to which we can give no conclusive answer, seeing it was impossible to detect any, even with the aid of a powerful magnifier. The nervous stem consisted of a light, broad layer, fig. 9, *i*, and of a dark, narrow one, fig. 9, *k*; the latter was directed inwards, and coalesced with the wall of the vessel. The nerve was composed of a peripheral cellular layer and a central fibrous layer. From the radial nerves — throughout their entire length — numerous offshoots proceeded to the muscles and the skin.

Generative Organs.

The few specimens (4) we have had the opportunity of examining were all females. The generative organ in

dannes af to aflange Sække, Fig. 20. *a, a,* der forene sig til en fælles temmelig lang Udførselsgang, Fig. 20, *b,* der er fæstet til Tarmen tæt ved dennes Begyndelse med en kort Bindevævstraad, og løber fortil ved Siden af Stenkanalen for at udmunde paa Midten af Ryggen, strax bag Tentakelranden. Sækkene vare opfyldte af Æg i forskjellige Udviklingsstadier, Fig. 20, *c.*

Farven.

Huden i levende Live vandklar med fine glindsende Punkter. Tentaklernes Blade brunt pigmenterte i Randen.

Findested.

Stationerne 283, 295 og 312.

Slægtskarakter.

Legemet cylindrisk, fodløst, tilrundet i den bagerste Ende. Kjønnet adskilt, ingen Tarm-Appendices (Respirationsorganer). Huden forsynet med to Slags forskjelligformede Kalkhjul. Det ene Slags Hjul har vingeformede Radier, og fra Peripheriens indre Rand udgaa Tænder. Det andet Slags Hjul er mere end dobbelt saa stort, har ligeledes vingeformede Radier, men fra Peripheriens ydre Rand udgaa lange indadvendte Tænder. 12 fingerformede Tentakler, der kunne skjules i Legemet.

Artskarakter.

Legemet 10—12^{mm} langt, cylindrisk, bredere og afrundet i den bagerste Ende. Mund- og Analaabningen central. Huden glasklar, overalt besat med 2 Slags forskjelligformede Hjul. Det ene Slags ere stilkede, smaa, forsynede med i Regelen 11 Radier, og fra Peripheriens indre Rand udgaa i Almindelighed to trekantede Tænder imellem hver to Radier. De store Hjul have i Regelen fra 8—11 Radier, og fra Peripheriens ydre Rand udgaa ligesaa mange lange tilspidsede Tænder, som der er Antal af Radier. 12 Tentakler forsynede med 3 delte, fingerformede Blade.

the female is composed of 2 oval sacs, fig. 20, *a, a,* which unite to form a rather long eferent duct, fig. 20, *b,* webbed to the intestine in close proximity to its origin by a short membranous filament, and extending forwards along the sand-canal; it disembogues in the middle of the back, immediately posterior to the tentacular margin. Both sacs were full of ova in various stages of development, fig. 20, *c.*

Colour.

In living examples, the skin is transparent, with minute glittering points studding its surface. Tentacular pinnæ brown along the margin.

Locality.

Stations 283, 295, and 312.

Generic Character.

Body cylindric, without feet, rounded at the posterior extremity. The sexes separate; no intestinal appendices (respiratory tubes). The integument furnished with two kinds of calcareous wheel-shaped spicules, differing alike in form and size. One has petaloid radii, and teeth projecting from the inner margin of the periphery; the other, more than twice the size of the first, also provided with petaloid radii, but with long teeth, directed inwards, on the outer margin of the periphery. Twelve digitate tentacles, which admit of being retracted into the body.

Specific Character.

Body, measuring from 10^{mm} to 12^{mm} in length, cylindric, broadest and rounded at the posterior extremity. Position of mouth and anal opening central; skin crystalline, in which are everywhere imbedded 2 kinds of calcareous wheels, differing alike in form and magnitude. The one, small and pedunculate, is generally furnished with 11 radii, and on the inner margin of the periphery there are, as a rule, two triangular teeth, placed each between two radii. The large wheels have mostly from 8 to 11 radii, and from the outer margin of the periphery project as many long, pointed teeth as there are radii. Twelve tentacula, with three digitate pinnæ.

Trochostoma[1] **Thomsonii**[2], n. g. & n. sp.

Tab. VII, VIII, IX. Fig. 1—41.

Til de fodløse Lungeholothurier har afdøde Professor M. Sars henført en til Slægten *Molpadia* henhørende Art, som han har kaldt *Molp. borealis.* Slægten *Molpadia,* der først er opstillet af Cuvier, og hvortil der i Tidernes Løb har været føiet flere Arter, har af Semper været underkastet en kritisk Behandling, hvoraf er resulteret, at flere af de til Slægten *Molpadia* henførte Arter ere blevne dragne ind under andre Slægter.

Slægten *Molpadia* har han saaledes skarpere begrændset, idet han har angivet som Karakterer særegne Svælgretraktorer og de Cuvierske Organer. Paa dette Grundlag har han henført Pourtalès's *Molpadia oolitica* til Grubes Slægt *Haplodactyla,* da den mangler de for Slægten *Molpadia* karakteristiske Kjendemærker; derimod har han ikke erkjendt Sars's *Molp. borealis* som nogen selvstændig Art, men forenet den med *M. oolitica.*

Vi kunne samstemme med Semper i, at Pourtalès's Art ikke kan henføres til Slægten *Molpadia,* og hvad nu Sars's Art betræffer, saa har Pourtalès fyldestgjørende godtgjort, at den er forskjellig fra hans *oolitica* og maa opføres som en selvstændig Art, og heri ere vi enige; men vi kunne ikke være enige med Semper i at henføre disse to Arter til *Haplodactyla,* der har en glat Hud, 15—16 enkelte cylinderformede Tentakler; thi begge have de en ru Hud og 15 korte fingerformede Tentakler. Da vi nu ikke af ovennævnte Grunde har kunnet henføre hverken *M. borealis* eller *oolitica* til Slægten *Haplodactyla,* saa skulle vi henføre dem til den af os ny opstillede Slægt *Trochostoma,* med hvilken de i væsentlige Punkter falde sammen, og hvorom vi senere skulle udtale os.

De ydre Karakterer.

Legemet er agurkdannet, ru paa dets Overflade og smalere mod begge Ender. Et fuldvoxent Dyr er indtil 135^{mm} langt, dets Tykkelse, der er størst paa den nederste Trediedel, er temmelig afhængig af, hvorvidt Dyrets Krop er udspændt eller ikke. I udspændt Tilstand maalte et Exemplar, der var 135^{mm} langt, 100^{mm} i Omkreds paa det Tykkeste. Dets bagerste Ende har en haleformig Forlængelse, der er næsten cylindrisk, og paa hvis Spids findes en rund Aabning omgivet af 5 smaa Tænder, der ere bredere ved Basis, smalere i Spidsen, Tab. VII, Fig. 1, *a.*

Dyrets forreste Ende, som er temmelig smal, er fuldkommen cylindrisk, og paa dens ligesom tvert afskaarne Del sees Mundskiven, i hvis Midte den runde Mundaabning findes, Fig. 1, *b.* Mundskivens Midtparti er i en Bredde af 3—4^{mm} lidt hvælvet og glat, Fig. 2, *a,* imedens den øvrige Del, der udgjør en Bredde af 7—9^{mm}, optages af 15

[1] Slægtnavnet er dannet af τροχός = et Hjul og ϛτομα = Mund.
[2] Artsnavnet efter Professor C. Wyville Thomson.

Trochostoma[1] **Thomsonii**,[2] n. g. & n. sp.

Pl. VII. VIII. IX; figs. 1—41.

To the Holothurians without feet, but having respiratory trees, the late Professor M. Sars referred a species belonging to the genus *Molpadia,* giving it the name of *Molp. borealis.* The genus *Molpadia,* first established by Cuvier, and to which several species have since been added, was made the subject of a critical investigation by Semper, the result of which has led to the classing of several species, previously referred to the genus *Molpadia,* under other genera.

Hence, the limits of the genus *Molpadia* are now more closely determined, Semper having regarded as characters special pharyngeal retractors and Cuvier's organs. On this basis, accordingly, he has referred Pourtalé's *Molpadia oolitica* to Grube's genus *Haplodactyla,* wanting as it does the characteristic features peculiar to the genus *Molpadia;* Sars's *Molp. borealis,* however, he has not regarded as specifically distinct, but as identical with *Molp. oolitica.* We quite agree with Semper in not referring Pourtalé's species to the genus *Molpadia;* but with regard to Sars's species, Pourtalé's has given satisfactory proof of its non-identity with his *oolitica,* and the necessity therefore of establishing it as a distinct species; of this we were likewise convinced, but we cannot agree with Semper in referring both species to the genus *Haplodactyla,* distinguished by a smooth skin and 15—16 simple, cylindric tentacles; for they have each a rough skin and 15 short digitate tentacles. Not being able, therefore, to refer either *M. borealis* or *oolitica* to the genus *Haplodactyla,* we shall class them, under our new genus *Trochostoma* — to be afterwards described — with which they have many important features in common.

Exterior Characters.

Body cucumber-like in form, with a rugose surface, and narrowest at the extremities. A full-grown specimen measures 135^{mm} in length; thickness, greatest in the inferior third, dependent on the expansion of the body. An individual measured after it had blown itself out, 135^{mm} in length, and the circumference of the body in the thickest part 100^{mm}. The posterior extremity is furnished with a caudiform appendix, almost cylindric, and having at the terminal point a round aperture, surrounded by 5 denticles, broadest at the base, Pl. VII, fig. 1, *a.* The anterior extremity of the animal, which is rather slender, has a perfectly cylindric form, and on the truncate portion is seen the oral disk, with the round oral aperture in the centre, fig. 1, *b.* The central portion of the oral disk, over a space from 3^{mm} to 4^{mm} in width, is slightly arcuate and smooth, fig. 2, *a;* the remainder, from 7^{mm} to 9^{mm} in width, being occupied

[1] The generic name is from τροχος, a wheel, and ϛτομα, mouth.
[2] The species is dedicated to Professor C. Wyville Thomson.

rørformige Forlængelser, som strække sig fra den ydre Rand til den hvælvede glatte Del af Skiven. Fig. 1. c. 2. c, — og der, hvor de ophøre, findes en skarp Fordybning, som adskiller den hvælvede indre Del af Skiven fra dennes ydre Del. Fig. 2, b. Imellem disse Forlængelser sees aflange Fordybninger, der ere bredere udad. Fig. 1. d. 2. d, og i disse Fordybninger iagttages ligesaa mange yderst korte — næsten rudimentære — tredelte Tentakler. Fig. 2. e. Naar Dyret er udstrakt, saa er ogsaa de rørformige Forlængelser opsvulmede og hvælvede, og da faar Legemets forreste Del Lighed med et Hjul, hvis Centrum dannes af Munden, Peripherien af Mundskivens ydre Rand, og Radierne af de rørformige Forlængelser.

Legemets Overflade er ved 5 Par Længdemuskler delt i 5 Felter, hvoraf 2 tilhøre Rygsiden og tre Bugsiden. Længdemusklerne strække sig fra den forreste lige ud til Spidsen af den bagerste Ende. Hvert Muskelpar er adskilt ved et Mellemrum af omtr. 1^{mm} Bredde. Fig. 1. e.

by 15 tubular prolations, extending from the outer margin to the smooth arcuate section of the disk, fig. 1. c; 2. c; and at the point where they terminate is seen a well defined furrow, which separates the inner arcuate portion of the disk from the outer, fig. 2. b. Between these prolations are seen a number of oval cavities, broadest externally, fig. 1. d; 2. d; and these cavities contain each an exceedingly short — almost rudimentary — tripartite tentacle, fig. 2. e. When the animal blows itself out, the tubular prolations also become swollen and arcuate, which gives to the anterior part of the body the appearance of a wheel, the mouth representing the nave, the outer margin of the oral disk the circumference, and the tubular prolations the spokes. Five pairs of longitudinal muscles divide the surface of the body into as many sections, 2 of which belong to the dorsal and three to the ventral surface. The longitudinal muscles extend throughout the whole length of the body, from the anterior to the posterior extremity. A space about 1^{mm} in width intervenes between each pair of muscles, fig. 1. e.

Huden.

Huden er bygget som hos Holothuriderne i Almindelighed. Cuticula, der danner det yderste Lag, er glat, gjennemsigtig og strukturløs. Tab. VIII. Fig. 19. a. Epithelet eller Subcuticularlaget, der ligger indenfor, dannes af Cylinderceller. Fig. 19. b. Indenfor dette er Corium, der er omtrent 0.3^{mm} tyk paa Midten af Legemet, medens den imod begge Ender bliver indtil 0.5^{mm}.

Den egentlige Læderhud bestaar af en temmelig fast Bindevævssubstants, i hvis ydre Lag findes forskjelligformede Kalklegemer, samt Pigmentceller, Tab. VIII. Fig. 16. 17. Dette ydre Lag er tæt sammenvævet af Bindevævsfibriller, som krydse hverandre i forskjellige Retninger, Tab. VIII. Fig. 19. c. og sammenkittes af en hyalin intermediær Substants. Pigmentcellerne have Udløbere og ere fyldte med et mere eller mindre mørkeviolet Farvestof, der ogsaa paa enkelte Steder findes i mindre Klumper udenfor Cellerne. Disse Klumper ere temmelig spredte paa en stor Del af Læderhuden, imedens de paa enkelte Steder ere leirede meget tæt sammen, hvor de endog ligge i Rækker.

Det indre Bindevævslag, Tab. VIII. Fig. 19. d. er yderst smalt, hyalint, har hist og her enkelte Fibre, der synes at være Fortsættelser fra det ydre Lag, og er sparsomt paa smaa runde Kalklegemer. Ved at behandle et Tversnit af Huden med Reagentser, nemlig enten Eosin eller Picrokarmin, Glycerin og en fortyndet kaustisk Kalilud, differentserer de forskjellige Væv sig saavidt, at det bliver muligt at iagttage dem, og da sees under stærk Forstørrelse (Gundelach No. VI—I) i det indre hyaline Bindevævslag baade forgrenede Bindevævsceller, Tab. VIII. Fig. 36. og mere eller mindre aflange, temmelig klare Celler,

Skin.

The composition of the integument is that common to Holothurians. The cuticle, forming the outer layer, is smooth, translucent and structureless, Pl. VIII. fig. 19, a. The epithelium, or subcuticular layer, extending beneath it, consists of cylindric cells, fig. 19. b. Underneath the latter is the corium, about 0.3^{mm} thick in the middle of the body and 0.5^{mm} near both extremities.

The corium consists of rather firm connective tissue, in the outer layer of which are dispersed calcareous spicules, differing in form, and pigmentary cells, Pl. VIII. figs. 16. 17. This outer layer is built up of closely interwoven fibrils of connective tissue, which intersect one another in various directions. Pl. VIII. fig. 19. c, a hyaline substance joining them, as it were, together. The pigmentary cells are furnished with offshoots, and contain a more or less deep violet-coloured substance, which in some places occurs as small lumps outside the cells. These lumps are a good deal scattered throughout a considerable portion of the corium, but exceedingly close in some places, where they even constitute distinct series.

The inner layer of connective tissue, Pl. VIII. fig. 19. d, is very narrow, hyaline, with here and there a few fibrils, continuations apparently of the outer layer, and is but sparingly provided with small circular calcareous corpuscles. On treating a section of the integument with chemical agents, for instance eosine, picrocarmine, or glycerine and a diluted solution of caustic potash, the various tissues admit of being observed separately, and, when viewed under a powerful magnifier (Gundelach No. VI—I), both ramose cells of connective tissue, Pl. VIII. fig. 36, and more or less oblong, brightish cells, containing an agglome-

der indeholde en Samling af klare Moleküler, Tab. VIII, Fig. 37. Disse Celler ligge altid enkeltvis, temmelig spredte, have stundom ligesom en kort Udløber og findes næsten overalt, hvor dette hyaline, saagodtsom fiberløse, Bindevæv optræder.

Det er sikkerlig lignende Celler, som Semper har fundet hos en hel Del Holothurider, og som han har kaldt Slimceller. Men det tør være et Spørgsmaal, om disse Celler fungere som slimafsondrende Organer; de synes snarere at være særegne Bindevævslegemer, der tjene til at opretholde Bindevævet. Imidlertid maa vi tilstaa, at vi ikke have fundet andre Organer i Huden, der kunne afsondre Slim, hvoraf der vistnok findes noget i Huden paa *Trochostoma*, omendskjønt den ydre Flade intet Slimovertræk har, hvilket jo er Tilfældet med Holothuriderne i Almindelighed.

Muskellaget er bundet til den indre Flade af Læderhuden og bestaar af Tver- og Længdemuskler. Tvermusklerne ere fra 0.5—1^{mm} brede, støde saagodtsom umiddelbart til hinanden, Tab. VII, Fig. 3, *a*, og sammenbindes ved et fint Bindevæv, hvori findes smaa runde Kalklegemer, der stundom ligge i Rækker langs Musklernes Rande, Tab. VIII, Fig. 18.

Vi have benævnt dem Tver- og ikke Ringmuskler, thi de danne ingen Ring, men ere afbrudte ved Længdemusklerne. Tvermuskler er derfor en bedre Benævnelse; de ophøre sædvanligvis henimod Midten af Længdemusklen, sjelden gaa de lige hen til det imellem begge Længdemuskler liggende Længdekar. Der bliver altsaa et Rum af henved et Par Millimeters Bredde, hvor Længdemusklerne og Længdekarret samt Nerver ligge i umiddelbar Berørelse med det indre Lag af Corium. Semper[1] har ogsaa iagttaget, at de egentlige Ringmuskler kun findes hos Slægterne *Synapta, Chirodota,* samt hos *Anapta gracilis,* imedens de hos alle andre Holothurider ere ligesom hos vor Slægt afbrudte. Tvermusklerne paa den bagerste Ende i Omkredsen af Endetarmen blive stærkere og danne omkring dennes Aabning en temmelig tyk Sphincter. Paa den forreste Ende ophører Tvermusklerne ved Mundskivens ydre Rand uden at gaa over paa den.

Længdemusklerne danne 5 Par; hver Muskel har en Bredde af omtr. 3^{mm}, og Rummet imellem hvert Par er omtr. 1^{mm} bredt, Tab. VII, Fig. 3, *b*. De indtage Kroppens hele Længde, og paa dennes forreste Ende, idet de gaa over paa Kalkringen, forener hvert Par sig til en stærk Tendo, der insererer sig i en Fordybning, som findes paa den udvendige Side af Radialstykkets forreste og ydre Forlængelse, Tab. VII, Fig. 8, *a*. Bagtil, lige ned imod Enden, forener hvert Par sig i en flad, temmelig tynd Tendo,

[1] Reisen im Archipel der Philippinen. 1ste Band. Holothurien, pag. 157.

ration of limpid molecules, Pl. VIII, fig. 37, are seen in the inner hyaline layer. These cells are invariably isolated, and comparatively distant; they have sometimes a kind of short offshoot, and are observed wherever almost this hyaline and, we may say, non-fibrous connective tissue occurs.

They were assuredly similar to these, the cells Semper found in many Holothurians, and to which he gave the appellation of mucous cells. But it is doubtful whether the function of these cells be secretory; they should, we think, be regarded rather as peculiar corpuscles of connective tissue, serving to strengthen the connective tissue. We must however admit, that we have failed to detect other organs in the skin capable of secreting mucus, of which the skin in *Trochostoma* certainly exhibits traces, although the outer surface has no mucous covering, which indeed is generally the case with Holothurians.

The muscular layer is connate with the inner surface of the corium, and consists of transverse and longitudinal muscles. The transverse muscles are from 0.5^{mm} to 1^{mm} broad, very nearly contiguous, Pl. VII, fig. 3, *a*, and webbed together by a thin layer of connective tissue, in which are numbers of small round calcareous corpuscles, sometimes arranged in rows along the margin of the muscles, Pl. VIII, fig. 18.

We have termed them transverse and not annular muscles, since they do not form a ring, being intersected by the longitudinal muscles; transverse muscles is therefore a better designation. They generally terminate near the middle of the longitudinal muscles, rarely extending to the longitudinal vessel between the two longitudinal muscles. Hence there is a space, about two millimetres in width, where the longitudinal muscles, the longitudinal vessel, and the longitudinal nerves are in direct contact with the inner layer of the corium. Semper[1] has also observed, that annular muscles, in the strict sense of the word, do not occur save in the genera *Synapta, Chirodota,* and *Anapta gracilis;* in all other Holothurians, including the genus now described, the muscles corresponding to them are disrupted. The transverse muscles at the posterior extremity of the body become more powerful as they approach the anus, surrounding the latter with a comparatively thick sphincter. At the anterior extremity, the transverse muscles terminate in immediate proximity to the outer margin of the oral disk, without extending on to it.

There are 5 pairs of longitudinal muscles; each muscle is about 3^{mm} broad, and the space between each pair about 1^{mm}, Pl. VII, fig. 3, *b*. They extend througout the entire length of the body; and, at its anterior extremity, where they reach the calcareous ring, each pair unites to form a powerful tendon, which has its socket in the exterior surface of the outer and foremost process of the radial segment, Pl. VII, fig. 8, *a*. Posteriorly, close to the extremity of the body, each pair unites, forming a flat and com-

[1] Reisen im Archipel der Philippinen. 1ste Band. Holothurien, pag. 157.

der fæster sig paa Basis af hver Analtand. Disse Længdemuskler ere fæstede dels til selve Corium, dels til Tvermusklerne ved en Mængde Bindevævstraade, hvoraf der udgaar mindst en fra hver Tvermuskel. Saavel Længdesom Tvermusklerne ere beklædte af et Peritoneum, der er yderst tyndt og gjennemsigtigt, og dannes af en hyalin Grundmasse, hvori findes en Mængde Bindevævsfibre, spredte Muskelfibre og runde Kalklegemer, Tab. VIII, Fig. 18; dets frie Flade har et flimrende Epitheloverttræk.

Hvor Huden paa Mundskiven danner de tidligere omtalte rørformige Forlængelser, er den meget tynd, halv gjennemsigtig, og i den egentlige Hud findes Bindevævsfibre og yderst sparsomt runde Kalklegemer, fuldkommen lig dem, som findes i Peritoneum; dette overtrækker Rørenes indre Flade, saa at ogsaa her iagttages det samme Epithel, som i Kropshulheden.

De Kalklegemer, som giver Huden sin Fasthed og Støtte, findes som sædvanligt i det ydre Lag af Corium, Tab. VIII, Fig. 19, *e*. De have en forskjellig Form, eftersom de indtage Legemets Midte, eller dets Ender, og fremstille sig egentlig under 2 Hovedformer, nemlig de smaa, dels elliptiske, dels runde Legemer, og de store, mere sammensatte Legemer, hvis Grundform er trearmet.

De elliptiske Legemer have en smuk vinrød Farve, ere fra 0.045—0.089^{mm} lange, fra 0.036—0.071^{mm} brede; de bestaa af en næsten rund, temmelig mørkerød Kjerne, en lysere rød peripherisk Del, og have megen Lighed med en virkelig Celle med dennes Kjerne og Kjernelegeme, Tab. VIII, Fig. 16, *a, a*. Ved meget stærk Forstørrelse viser det sig, at de ere dannede af concentriske Lag.

De runde Kalklegemer ere enten farveløse, eller de have en yderst svag, dels brunlig, dels violet Farve. De have en Størrelse fra 0.026—0.088^{mm}, bestaa af flere og færre Facetter og have et straalet Udseende, saa at man tæller fra 3—10 Straaler, alt efter Facetternes Antal, Tab. VIII, fig. 16, *b, b*. Af disse Kalklegemer, saavel de elliptiske, som runde, findes der en stor Mængde; de ligge stundom tæt ved Siden af hverandre, stundom ligge de mere spredte imellem de store Kalkplader, som nu skulle beskrives, aldrig ligge de pakkede op paa hverandre.

De store Kalklegemer have en forskjellig Form, alt eftersom de findes paa Midten af Legemet, eller i dettes begge Ender; men alle have den trearmede Grundtype, Tab. VIII, Fig. 30—34. De Kalklegemer, der findes paa den største Del af Legemet, bestaa, naar de ere fuldt udviklede, af en gjennembrudt Plade, Fig. 27, 31, og af et fra denne udgaaende Skaft eller Krone, Fig. 30. Pladen dannes af et Centrum, hvorfra udgaar 3 Arme; hver Arm deler sig et kortere eller længere Stykke fra Centrum i 2, Fig. 25, *a*, hvoraf hver Gren, idet den voxer, bøier sig indad og støder til en tilsvarende Gren fra en anden Arm, hvorved fremkommer et Hul, Fig. 24. Enhver Plade be-

paratively thin tendon, which is attached to the base of each anal denticle. These longitudinal muscles are webbed partly to the corium and partly to the transverse muscles by a number of filaments of connective tissue, one, at least, proceeding from each transverse muscle. The longitudinal and the transverse muscles are both invested with a peritoneal membrane, exceedingly thin and translucent, which consists chiefly of a hyaline substance, strengthened by a number of fibres of connective tissue, isolated muscular fibres, and round calcareous corpuscles, Pl. VIII, fig. 18; its free surface has a covering of ciliated epithelium.

The integument on the oral disk, where it forms the tubular prolations described above, is exceedingly thin and semi-translucent; and in the corium are seen fibres of connective tissue and a very limited number of round calcareous corpuscles, perfectly similar to those in the peritoneum; the latter extends over the inner surface of the tubes, and here too, accordingly, is observed the same epithelium as in the perivisceral cavity.

The calcareous spicules that serve to give strength and firmness to the integument are, as is commonly the case, dispersed throughout the outer layer of the corium, Pl. VIII, fig. 19, *e*. They vary in form and size, according as they occur in the middle of the body or at the extremities; the small spicules are some elliptic and some round; the large ones, more complex in structure, are mostly trifid.

The elliptic spicules, of a beautiful vinous red, are from 0.045^{mm} to 0.089^{mm} long and from 0.036^{mm} to 0.071^{mm} broad; they consist of an almost circular, dark-red nucleus, a light-red peripheral portion, and bear considerable resemblance to a true cell, with its nucleus and nucleolus, Pl. VIII, fig. 16, *a, a*. When highly magnified, they are seen to be built up of concentric layers.

The round spicules are either colourless or have a faint tinge, some of brown and some of violet. They measure in diameter from 0.026^{mm} to 0.088^{mm}, have a greater or less number of facets, and present a radiate appearance, the number of rays, from 3 to 10, varying with that of the facets, Pl. VIII, fig. 16, *b, b*. These calcareous spicules, both the elliptic and the circular, are exceedingly numerous; in some places they lie close together, in others, between the large calcareous laminæ, which we shall next describe, they are more dispersed; they never lie packed one above the other.

The large spicules vary in form, according as they occur in the middle or at the extremities of the body; they are all of them however of the fundamental trifid type, Pl. VIII, fig. 30—34. On the greater part of the body the calcareous spicules, when fully developed, consist of a perforated lamina, fig. 27, 31, and of a shaft or corolla, fig. 30. The lamina has a centre-piece, from which proceed 3 arms; each arm divides dichotomously at some distance from the centre, fig. 25, *a*, and each offshoot, during the progress of its growth, bends gradually over to meet a corresponding offshoot from another arm, thus forming an orifice, fig. 24. Each lamina has therefore 3 elliptic-

staar altsaa i Regelen af 3 større eller mindre aflange Aabninger. Men imedens de trehullede Plader ere de almindeligste, findes der ogsaa Plader med flere Aabninger, og disse fremkomme derved, at enkelte af Grenene atter dele sig i to, for senere under Væxten at forene sig, Fig. 25, *b*. Fra Pladens Centrum hæver Skaftet eller Kronen sig; det er næsten rundt, lidt smalere paa Midten, men udvider sig temmelig mod den frie Ende, der er bred og forsynet med stærke spidse Takker, som variere i Antal fra 4—6, Fig. 30. Kalkpladerne have en Bredde fra 0.133—0.178^{mm} og en Længde fra 0.223—0.330^{mm}. Kronerne fra 0.133—0.313^{mm} høie. Pladerne ligge nedsænkede i Corium, dækket af Epithelet, og Kronerne rage ud over Læderhuden, beklædt af Epithel og Cuticula, og danne den Ruhed, som føles paa Hudens Overflade, Tab. VIII, Fig. 19.

Paa den forreste Del af Kroppen, fra Mundskivens ydre Rand og i en Strækning bagover af 6—8^{mm} findes Kalklegemer af noget forskjellig Form fra de nylig beskrevne. De ere meget mindre, have deres Leie ligesom de øvrige i Læderhudens ydre Lag, og ligge temmelig tæt til hverandre, saa at flere Kalkplader se ud, som om de hænge sammen, Tab. VIII, Fig. 17. Ogsaa her synes Tretallet at være den gjennemgaaende Grundform, Tab. VIII, Fig. 22. Kalkpladerne ere mere langstrakte, fra 0.107—0.187^{mm} lange, 0.089—0.098^{mm} brede; Armene ere tykke, og Hullerne, der i Almindelighed ere 3, kun sjelden 4, ere smaa, og som oftest udgaar til begge Sider en Forlængelse, Tab. VIII, Fig. 20, 21, 23. Kronen eller Skaftet er meget kort, omtrent 0.045^{mm} høi; den udspringer hyppigst fra Midten af Pladen og har en tykkere fri Ende, der er forsynet med 3—4 spidse Takker, Tab. VIII, Fig. 17, *a*. Paa enkelte Plader sees Kronen at hæve sig enten fra den ene Ende eller fra en af Armene; men dette Forhold er dog sjeldent, Tab. VIII, Fig. 20.

Lignende Kalklegemer som de, der findes paa Dyrets forreste Del af Kroppen, iagttages ogsaa paa dets bagerste Ende. Her, fornemmelig paa den haleformige Forlængelse, slutter Kalklegemerne sig saa tæt til hverandre, at de faa Udseende af et sammenhængende Pantser. Analtænderne dannes af lignende Kalklegemer som de, der findes paa den bagerste Ende af Kroppen, kun ere de paa Tænderne noget mindre og slutte sig her saa tæt sammen, at Tanden ser ud, som om den bestod af et eneste Kalknet.

I Huden paa den hvælvede, glatte Del af Mundskiven findes kun yderst faa spredte, smaa, runde Kalklegemer, lig dem, som findes i Peritoneum. I Tentaklernes Hud findes i Corium meget spredte, runde Kalklegemer, hvoraf de mindste have en Størrelse af 0.009^{mm}, ere uden Farve og have i Centrum et kuglerundt, stærkt lysende Korn; de største ere 0.013^{mm}, have et gulagtigt, straalet Udseende, og nærme sig meget de facetformige Kalklegemer, der tidligere ere omtalte.

shaped openings. The great majority of the laminæ have three apertures; some, however, are furnished with a greater number, certain of the branches again dividing dichotomously, to unite as the growth progresses, fig. 25, *b*. From the centre of the lamina springs the shaft, or corolla; it is almost circular, a trifle narrower in the middle, expanding however considerably towards the free end, which is broad and furnished with powerful spikes, varying in number from 4 to 6, fig. 30. The calcareous laminæ are from 0.133^{mm} to 0.178^{mm} broad and from 0.223^{mm} to 0.330^{mm} long; the height of the corolla is from 0.133^{mm} to 0.313^{mm}. The laminæ lie imbedded in the corium, which is covered by the epithelium and the cuticle; and the corollæ, enveloped in the epithelium and the cuticle, project above the coriaceous integument, giving to the surface a rugose feel, Pl. VIII, fig. 19.

On the anterior portion of the body, over a space extending 6^{mm}—8^{mm} from the outer margin of the oral disk, are seen calcareous spicules, somewhat different in form to those described above. They are much smaller, lie imbedded, as do the others, in the outer layer of the corium, and rather close, so that some have a connate appearance, Pl. VIII, fig. 17. Here, too, the form is mostly trifid, Pl. VIII, fig. 22. These laminæ are more elongate, measuring from 0.107^{mm} in length and from 0.089^{mm} to 0.098^{mm} in breadth; they have thick arms, and the apertures, generally 3 in number, rarely 4, are small; in the majority, too, a process protends from both sides, Pl. VIII, figs. 20, 21, 23. The corolla, or shaft, is very short, about 0.045^{mm} high; it generally springs from the middle of the lamina, and is thickest at the free extremity, which has from three to four acuminate spikes, Pl. VIII, fig. 17, *a*. On some of the laminæ, the shaft, *k*, *k*, protends either from one of the extremities or from one of the arms; but this is comparatively rare, Pl. VIII, fig. 20.

Calcareous spicules similar to those on the anterior portion of the body, occur likewise on the posterior extremity. Here, more especially on the caudal elongation, the arrangement of the calcareous spicules is so close as to give the appearance of a continuous armature. The anal denticles are composed of calcareous corpuscles similar to those on the posterior extremity of the body, but somewhat smaller, and so close together that each denticle has a reticulate appearance.

The integument on the smooth, arcuate portion of the oral disk exhibits but few calcareous spicules — small, round, and scattered, similar to those in the peritoneum. In the corium of the tentacular integument are seen a number of calcareous spicules, widely dispersed; the smallest have a diameter of 0.009^{mm}, are colourless, and with a globular, highly lustrous granule in the centre; the largest measure 0.013^{mm} in diameter, and have a yellowish rayed appearance, presenting considerable resemblance to the facet-shaped spicules mentioned above.

Fordøielsesorganerne.

Indgangen til Svælget, det saakaldte Atrium, har en stærk Sphincter, der dannes af Spiserørets Ringmuskler, idet disse forlænge sig op over den midterste Del af Mundskiven, i hvis Centrum Atriet findes. Dette er forsynet med skarpt fremragende Længdefolder, der dog ganske udslettes, naar Mundaabningen er tilstrækkelig udvidet. Disse Folder blive ved Sphincters Sammentrækning saa skarpe, at enkelte Forfattere, f. Ex. Risso, har kaldt dem Tænder.

Svælget er cylindrisk, omtrent 10mm langt, strækker sig mindst 5mm bagenfor Vandkarringen, er meget muskuløs, har en mere eller mindre intens brun Farve, og et smukt netformigt Udseende. Det er bundet til Kalkringen ved 5 dobbelte Længderækker af Muskelbaand. Disse bestaa af en eller flere Muskelbundter, som ere sammenbundne ved et stærkt fibrillært Bindevæv. Rækkerne synes at følge Kropsfelterne, saa at 3 falder paa Bugfladen og 2 paa Rygsiden. I hver Række er der omtrent 10 Muskelbaand, der ere bredest udad mod Kalkringen, hvor de inserere sig paa Siden af Radialstykkerne.

Svælget bestaar af de samme Hudlag, som hele den øvrige Tarmkanal, kun træde enkelte Lag i Svælget frem med større Styrke, end paa de øvrige Steder. Svælgets ydre Flade er beklædt med et flimrende Epithel, der egentlig er Peritonealovertrækket; under dette findes et temmelig tyndt, gjennemsigtigt Bindevæv, som er sparsomt paa Fibre, og hvori der ikke kunde iagttages Celler. Dette ydre Bindevævslag støder umiddelbart til Muskelhudens Ringmuskler, som her slutte sig tæt til hverandre, uden dog at være anderledes sammenhængende, end at der imellem hver Ringmuskel sees en fin Stribe af Bindevæv. Længdemusklerne staa noget længere fra hverandre, og idet de overskjære Ringmusklerne, faar Muskelhuden et gittret Udseende, ikke ulig Sipunkelhuden. Flere af Længdemusklernes Fibre anastomosere med hverandre.

Indenfor Længdemusklerne findes atter en Bindevævshud, der bestaar af to Lag; det ydre Lag, der støder umiddelbart til Længdemusklerne, er stærkt fibrillært og optages næsten ganske af en rig, netformig Karudbredning; det indre Lag er meget tykkere, temmelig gjennemsigtigt, og i dette sees yderst fine Kalkkorn, hist og her enkelte Fibre, og endelig en Mængde spredte, aflange klare Celler, som indeslutte 8—12 gjennemsigtige Moleküler, de samme, som tidligere ere omtalte i Hudens indre, hyaline Bindevævslag. Paa dette indre Bindevævslag hviler Epithelet, som er meget tykt, bestaar af flere Lag lange Celler (Cylinderepithel), og udgjør den egentlige Slimhud, som her danner tætstaaende Længdefolder, der rage ind i Svælget. Hvor dette gaar over i Maven findes udvendig en Indsnøring.

Digestive Organs.

The entrance to the gullet, or atrium, as it is called, has a powerful sphincter, the annular muscles of the œsophagus being prolonged up over the medial portion of the oral disk, in the centre of which the atrium is located. The latter is furnished with acuminate projecting longitudinal folds, which, however, entirely disappear when the oral aperture is sufficiently distended. On the contraction of the sphincter, these folds assume so acuminate an appearance, that some authors, Risso for instance, have given them the name of teeth.

The œsophagus is cylindric in form, about 10mm long, extends 5mm at least behind the water-vascular ring, is remarkably muscular, of a more or less deep-brown colour, and has a fine reticulated appearance. It is webbed to the calcareous ring by 5 double longitudinal series of muscular bands, which consist of one or more fascicles of muscles, webbed together by a strong fibrillous layer of connective tissue. These series would seem to accompany the sections of the body, so that 3 belong to the ventral and 2 to the dorsal surface. Each series is furnished with about 10 muscular bands, broadest externally towards the calcareous ring, where they issue from the sides of the radial segments.

The œsophagus is composed of the same tegumentary layers as the intestinal canal; but several of the pharyngeal layers exhibit greater density than do those of the latter organ. The outer surface of the œsophagus is invested with a vibratile epithelium, in a strict sense the peritoneal tunic; beneath the latter extends a rather thin translucent layer of connective tissue, sparingly furnished with fibres, and in which no cells could be detected. This outer layer of connective tissue is connate with the annular muscles of the muscular tunic, between each pair of which, though their arrangement here is comparatively close, may be discerned a slender filament of connective tissue. A somewhat wider space intervenes between the longitudinal muscles, which, on their intersecting the annular muscles, give to the skin a shiny, glittering appearance, not unlike that characterising the muscular tunic in *Sipunculus*. Several of the fibres in the longitudinal muscles anastomose one with the other.

Underneath the longitudinal muscles extends another stratum of connective tissue, composed of two layers; the outer layer, contiguous to the longitudinal muscles, is exceedingly fibrillous, and almost entirely composed of a reticulate vascular assemblage; in the inner layer, which is much thicker, are seen exceedingly minute calcareous granules, here and there, too, a few fibres, and, widely dispersed, numbers of bright elliptic-shaped cells, containing from 8 to 12 translucent molecules, similar to those, already described, in the inner hyaline layer of connective tissue. Over this inner layer of connective tissue extends the epithelium, which is very thick, consisting of several layers of elongate cells (the cylindric epithelium), and constitutes the mucous integument, which here forms closely arranged longitudinal folds, projecting into the œsophagus. On the outer surface of the latter, where it opens into the stomach, is seen a constriction.

Maven er omtr. 6^{mm} lang, mindst dobbelt saa bred som Svælget. Ogsaa den har samme retikulære Ydre som Svælget; men er ikke saa stærk muskuløs, som dette, saaledes at dens Vægge, naar den ikke er udfyldt af Fødemidler, falde sammen, hvilket ikke er Tilfældet med Svælgvæggene, Tab. VII, Fig. 8, *c*. Paa Mavens indre Flade, just der, hvor Svælget gaar over i denne, findes en bred (næsten 1^{mm}) Fold, der som en Valvel (Cardia) hænger frit ned i Hulheden, og som vistnok bidrager til at forhindre, at de i Maven nedkomne Fødemidler stødes op igjen. Denne Valvel dannes af det indre Bindevæv og Epithelet. Mavens Muskelhud er tyndere, end Svælgets, idet Muskelbundterne staa længere fra hverandre; heller ikke er hverken det indre Bindevævslag eller Epithelet saa tykt som paa Svælget, ligesom Karudbredningen danner noget større Masker. Hvor Maven gaar over i Tarmen, findes ligeledes en liden Indsnøring, saa at Indgangen fra Maven til Tarmen er noget forsnevret, og kan sammenlignes med en Pylorus, Tab. VII, Fig. 8, *d*.

Tarmen danner 3 Slyngninger; den første gjør foroven en liden Bøining, gaar saa i næsten lige Retning ned imod den bagerste Ende, og optager den midterste Del af det dorsale Interradialrum, derpaa bøier den sig opover og danner nu den anden Slynge, som ligger i venstre ventrale Interradialrum, gaar nu under den første Slynge og kommer op imod Kalkringen paa høire Side, hvor den for tredie Gang bøier sig og danner den 3die Slynge, som stiger ned i lidt skjæv Retning i høire ventrale Interradialrum, idet den gaar over i den egentlige Endetarm, som smaler stærkt af i Dyrets haleformige Forlængelse og aabner sig paa dennes Spids, Tab. VII, Fig. 3. Her er ingen Kloak; Tarmen forlænger sig lige ud til den yderste Spids, men der, hvor den gaar over i Endetarmen, Tab. VII, Fig. 3, *c*, gjør den en liden Bøining, saa at Rectum faar en næsten perpendikulær Retning, Tab. VII, Fig. 3, *d*. Endetarmen er bunden til Kropsvæggen ved en Mængde stærke muskuløse Traade, og dens ydre Aabning er forsynet med en Spincter, der faar sine Muskelbundter fra Hudens Tvermuskler. Endetarmen svarer saaledes til Holothuridernes Kloak, og synes i denne Henseende at have særdeles meget tilfælles med *Synapta*.

Bauer[1] gjør opmærksom paa, at hos unge Individer af *Synapta* er den nederste Ende af Tarmen bunden med stærke muskuløse Traade til Kropsvæggen, hvorved denne Tarmdel, ifølge ham, bliver et "Analogon" til Holothuridernes Kloak.

Tarmens Vægge ere i Forhold til Svælgets og Mavens meget tynde og halvgjennemsigtige, fordi at samtlige Hudlag, hvoraf de bestaa, ere tyndere; dog er Endetarmens noget tykkere end den øvrige Tarms. Paa de første Tarmslyngers indre Flade, især paa den nedstigende, findes hist

[1] Bauer. Beiträge zur Naturgeschichte der *Synapta digitata*. Dresden 1874, pag. 28.

The stomach measures about 6^{mm} in length, and is at least twice as broad as the œsophagus. This organ, too, has a reticulate surface, like the œsophagus, but is less muscular, so that its walls, when not distended with food, collapse, which is not the case with the walls of the œsophagus, Pl. VII, fig. 8, *c*. On the inner surface of the stomach, at the exact point where the œsophagus passes into that organ, is seen a broad (nearly 1^{mm}) fold, which, in the form of a valve (cardia) depends freely into the cavity, and doubtless serves to prevent food that has passed into the stomach from being ejected. This valve is formed by the inner layer of connective tissue in conjunction with the epithelium. The muscular tunic of the stomach is thinner than that of the œsophagus; neither is the inner layer of connective tissue nor the epithelium so thick as on the œsophagus, the fascicles of muscles lying less close, and the meshes of the reticulate vascular assemblage are somewhat larger. Where the stomach opens into the intestine there is likewise a slight constriction, so that the entrance from the stomach to the intestine is somewhat narrow, and may be compared to a pylorus, Pl. VII, fig. 8, *d*.

The intestine has 3 convolutions; the first makes a slight bend above, and passes on almost straight to the posterior extremity, occupying the middle of the dorsal interradial space; it then bends upwards, forming the second convolution, which lies in the left ventral interradial space, and passes on under the first convolution, reaching up to the calcareous ring on the right side, where it again bends, forming the third convolution, which descends, in a slightly oblique direction, through the right ventral interradial space, as it enters the rectum, which gets a good deal constricted in the caudal elongation of the body, on the extremity of which it opens, Pl. VII, fig. 3. Cloacum there is none, the intestine being prolonged to the extremity of the body; but at the point where it opens into the rectum, Pl. VII, fig. 3, *c*, it makes a slight bend, giving to the rectum an almost perpendicular direction, Pl. VII, fig. 3, *d*. The rectum is webbed to the wall of the body by a number of strong muscular filaments, and its outer opening is provided with a sphincter, the muscular fascicles of which are derived from the transverse muscles of the integument. Hence the rectum corresponds to the cloacum in Holothurians and so far seems to have much in common with that organ in *Synapta*.

Bauer[1] calls attention to the fact, that in young individuals of *Synapta digitata* the inferior extremity of the intestine is webbed to the wall of the body by strong muscular filaments, and this portion of the intestine must, therefore, as he conceives, be regarded as the analogue of the cloacum in Holothurians.

The walls of the intestine, compared to those of the œsophagus and the stomach, are exceedingly thin and semitranslucent, the several tegumentary layers of which they consist being thinner; those in the rectum are, however, somewhat thicker than the layers in the other parts of the

[1] Bauer. Beiträge zur Naturgeschichte der *Synapta digitata*, p. 28. Dresden, 1874.

og her en Mængde temmelig tætstaaende Tverfolder, i hvis Bindevæv iagttages stærke Karforgreninger, som paa sine Steder danne smukke Net. Disse Karnet svare visselig til dem, Semper har paavist at være tilstede i mange Holothuriders Tarmfolder, og som han antager staa i Respirationens Tjeneste, idet Søvandet skulde trænge op i Tarmkanalen og saaledes komme i Berørelse med det paa Tarmfolderne udbredte Karnet.

Tarmen hos vort Dyr er fuldt udfyldt af den fine graaligbrune Ler, som i Regelen danner Bunden paa de Steder, hvor det lever. I dette Ler findes en Mængde Foraminiferer (Globigeriner) og Diatomeer, som vistnok er Dyrets vigtigste Føde. Dersom Søvandet trængte op igjennem denne Lermasse, hvoraf Tarmen er fuldproppet, vilde upaatvivleligt dette Vand, naar det igjen udstødes, vise sig at være mere eller mindre grumset, men saa er ingenlunde Tilfældet. Vandet holdt sig klart, og nogen Ind- og Udstrømmen gjennem den nederste Aabning (Analaabning) var ikke at iagttage, hvorimod Excrementproppe stundom udfyldte ganske den nævnte Aabning, og kunde længe forblive staaende deri.

Vi kunne ikke ifølge vore Observationer antage, at der i Tarmen hos *Trochostoma* foregaar noget, der kan sammenlignes med Aandedrættet hos enkelte Insekter. Karnettet paa Tarmfolderne tjene snarere som et Lymphesystem, der optager de i Tarmen præparerede Næringssafter (Chymus) for at føre dem over i Blodet. Imedens Tarmen altid var propfuld af den nævnte Ler, var Spiserøret saagodtsom tomt, og i Maven var der vel endel af lignende Lermasse, men den var langtfra udfyldt deraf. Det synes, som om Fødemidlerne ikke opholde sig ret længe i Svælg og Mave, men jages snart ned i Tarmen, hvor den egentlige Fordøielse nok foregaar.

Noget Kjertelapparat i Tarmens, Mavens eller Svælgets Vægge have vi ikke fundet, og det tør vel være tvivlsomt, om noget saadant existerer hos vort Dyr, dersom man ikke vil antage de tidligere omtalte isolerede klare Celler, som findes i det indre hyaline Bindevæv, for specielle Afsondringsorganer, for Lever; men derom kan der vel neppe være Tale. Sikkert er det, at de brunlige kjertelformige Organer, der ifølge Sars skulde findes i Svælg og Mave, og som han formener muligens kunde tjene som Lever, ikke existere. De brunlige Legemer have vi ogsaa seet; men de ere hverken enkelte eller sammensatte Celler, der kunne optræde som Kjertler, de ere Klumper, der dannes af det brunrøde Blodplasma, som findes næsten overalt i Legemet, og som meget let koagulerer.

Foruden det ovenomtalte Tarmindhold, fandt vi ogsaa en Nematoide i temmelig stor Mængde. Det er sandsynlig, at den lever som Parasit hos dette Dyr, da vi fandt et Udviklingsstadium af den, i hvilket den spiralformig ligger indkapslet i Tarmvæggen.

intestine. On the inner surface of the two first convolutions, more especially that inclining downwards, are seen every here and there numbers of rather closely arranged transverse folds, through the connective tissue of which extend well-defined vascular ramifications, having in places a graceful, reticulate form. These vascular assemblages correspond unquestionably to those Semper has shown to occur in the intestinal folds of many Holothurians, and which, in his opinion, perform the office of respiratory organs, the sea-water being forced up into the intestinal canal, and thus brought in contact with the vascular net investing it.

The intestine in the specimen here described was full of the greyish-brown clay which generally covers the bottom in localities where this animal occurs. Such clay contains an immense number of Foraminifera *(Globigerinæ)* and Diatoms, which unquestionably constitute the chief food of the animal. Now, assuming the sea-water to be forced up through the clay with which the intestine is distended, it would, when ejected, have a more or less turbid appearance; but such is not the case. The water continued perfectly clear, nor could we detect any flux and reflux through the lower opening (anal aperture); nay, fæcal pellets sometimes stopped up the opening, and were not evacuated till after a comparatively long interval.

Our observations do not lead us to infer, that the intestine in *Trochostoma* is the seat of a functional process corresponding to that of respiration in certain insects. The vascular network on the intestinal folds would seem to serve rather as a system of lymphatic vessels for the reception of the alimentary juices (the chyme), to be afterwards conveyed to the blood. The intestine was invariably filled to repletion with the clay, whereas the œsophagus was almost empty; some of this clay, too, was found in the stomach, by no means however sufficient to distend it. The food would appear to remain but a short time in the œsophagus and stomach, being speedily forced down into the intestine, where no doubt digestion chiefly takes place.

No glands could be seen in the intestine, the stomach, or the walls of the œsophagus, and it is very doubtful whether any such exist, unless indeed the bright isolated cells, previously mentioned, in the inner hyaline layer of connective tissue be regarded as special secretory organs — as a liver; but this is surely out of the question. It is quite certain that brownish organs of a glandular form, which, according to Sars, occur in the œsophagus and stomach, and which he regards as possibly performing the office of a liver, do not exist. Brownish corpuscles, we, too, have observed, but these are neither simple nor complex cells that might serve the purpose of a liver, but mere lumpy fragments of the brownish-red sanguineous plasma occurring almost everywhere throughout the body, and which readily coagulate.

Exclusive of the clay which, as mentioned above, constitutes the chief contents of the intestine, we found a Nematoid in considerable numbers. It probably exists in this animal as a parasite, some of the individuals having represented a particular stage of development, during which it lies spirally incapsulated in the walls of the intestine.

Fordøielseskanalen er bunden til Kropsvæggen langs Rygsiden ved et Mesenterium, der paa Tarmslyngerne er meget bredt og danner her et særdeles smukt Bindevævsnet, bestaaende af temmelig store, aabne Masker.

Mesenteriet er sammensat af tvende Bindevævsblåde, hvori findes Muskelfibre, og hvis ydre Flader ere forsynede med det flimrende peritoniale Overtræk. Foruden det egentlige Mesenterium, er Tarmkanalen hist og her fæstet til Kropsvæggen ved lange, fine Muskeltraade, som bestaa af nogle faa Muskelbundter og et fibrillært Bindevæv, hvori er afsat en stor Mængde mere eller mindre runde Kalklegemer, Tab. VII, Fig. 9, lig dem, vi tidligere have beskrevet i Huden, og som især findes imellem dennes Tvermuskler. Fra disse udgaa de nævnte fine Muskeltraade, og følges da af det Bindevæv, der ligesom binder Hudens Tvermuskler sammen. At Kalklegemerne her dannes i selve Bindevævet uden nogensomhelst Epithelialhjælp, er klart nok; thi i de oftere omtalte fine muskuløse Tilheftningstraade findes ikke Spor af Epitheldannelse.

Vi skulle nu omtale de saakaldte Respirationsorganer, der hos alle hidtil kjendte Holothurider tage deres Udspring fra Kloaken. Hos vor nye Slægt findes ingen Kloak, og man skulde nu tro, at som Følge deraf maatte den være lungeløs; men saa er ikke Tilfældet. De to Respirationsrør tage deres Udspring fra selve Tarmen, nemlig fra den sidste nedstigende Slynge, 10—12^{mm} ovenfor Rectum, og 25^{mm} ovenfor Dyrets bagerste Ende, stundom lige ved Overgangen til Rectum, Tab. VII, Fig. 3, *e*. Det er fra Tarmens Sider, nærmere Rygfladen, at Udspringet er.

Det venstre Rør, som er kortest, omtrent halvt saa langt som Kroppens Længde, er cylindrisk, delt i 2 Grene, hvoraf den ene er temmelig kort, Tab. VII, Fig. 3, *f*. Røret er ligefra Roden mere og mindre tæt besat med større og mindre Blærer, som ere gjennemsigtige, og paa hvilke hyppigt iagttages en liden Grube, uden at der dog findes nogen Aabning. Dette venstre Rør strækker sig noget til Siden og ligger frit i venstre ventrale Interradialrum, kun bundet til dette ved meget lange fine Muskeltraade, i hvis Bindevæv findes den samme Rigdom af Kalklegemer som de, der sees paa de enkelte Muskeltraade, der binde Tarmen til Kropsvæggen.

Det høire Aanderør derimod indtager største Delen af Dyrets Længde, Tab. VII, Fig. 3, *g*. Det løber langs den indre Flade af Tarmens sidste nedstigende Slynge uden at være bunden til denne, og ligger egentlig i det høire ventrale Interradialrum, hvortil det er fæstet ved mange korte muskuløse Bindevævstraade. Naar det kommer op til Tarmens Bøining, gaar det over denne, og kommer da til at ligge i det høire dorsale Interradialrum, for at fæste sig paa Kalkringens to dorsale Radialstykker, nemlig paa

The digestive canal is webbed to the wall of the body along the dorsal surface by a mesentery, which on the convolutions of the intestine is exceedingly broad, forming a beautiful network, with rather large and open meshes.

The mesentery is composed of two leaf-shaped lobes of connective tissue, intersected by muscular fibres, and having their outer surface furnished with a vibratile peritoneal tunic. Exclusive of the mesentery, the intestinal canal is here and there attached to the wall of the body by long and slender muscular filaments, composed of a few fascicles of muscles and of fibrillous connective tissue, in which are dispersed large numbers of calcareous corpuscles, more or less circular in form, Pl. VII, fig. 9, similar to those in the skin, and which occur chiefly between the transverse muscles of the latter. From these muscles proceed the aforesaid muscular filaments, succeeded by a layer of connective tissue, webbing together, as it were, the transverse muscles of the integument. That the calcareous corpuscles occurring here originate in the connective tissue itself, irrespective of epithelial action, is evident; for in the slender muscular filaments frequently alluded to, no vestige of an epithelium can be detected.

We will now pass on to the respiratory organs, as they are termed, which in all Holothurians hitherto known originate in the cloacum. Now, in *Trochostoma* no cloacum exists, and this would seem therefore to be a "lungless" genus; but such is not the case. Two respiratory tubes have their origin in the intestine itself, viz. on the last of the descending convolutions, 10^{mm} or 12^{mm} above the rectum, and 25^{mm} above the posterior extremity of the animal, sometimes indeed in immediate proximity to the rectum, Pl. VII, fig. 3, *e*. The points of origin are on the sides of the intestine, nearest the dorsal surface.

The left tube, which is the shorter of the two, about half the length of the body, and cylindric in form, divides dichotomously, one of the branches being rather short. Pl. VII, fig. 3. This tube is furnished to a greater or less extent from its basal extremity upwards with translucent vesicles, which frequently exhibit a small cavity, or depression; but there is no opening. The left tube takes a lateral direction, extending along the left ventral interradial space, being webbed to the walls of the body by exceedingly long and slender muscular filaments, the connective tissue of which contains calcareous corpuscles similar to those observed in the muscular filaments that web the intestine to the wall of the body, and in equal abundance.

The right respiratory tube extends throughout the greater portion of the length of the animal, Pl. VII, fig. 3, *g*. It passes along the inner surface of the last descending convolution of the intestine, to which, however, it is not attached, and occupies the right ventral interradial space, being webbed to the walls of the body by numerous short filaments of connective tissue and muscular fibrils. On reaching up to the bend of the intestine, it stretches across it, passing into the right dorsal interradial space

den udvendige Flade af deres bagerste Forlængelse, ved stærke tendinøse Baand. Disse Rør med deres mangfoldige Blærer vise i histologisk Henseende den samme Bygning, som Tarmen; udvendig have de et flimrende Peritoneal-overtræk med sit Epithel, saa et tyndt, fibrillært Bindevævslag, hvortil Muskelhuden er bunden. Denne, der bestaar af langs- og tvergaaende Fibre, danner et rigt Maskenet, der var udfyldt af koaguleret Blodplasma; om dette indesluttes i en Karforgrening, der udfylder Maskenettet, eller det strømmer frit om i Lagene af Muskelhuden, kunne vi ikke afgjøre.

Indenfor Muskellaget sees atter en Bindevævshud, i hvis indre Lag, som er det bredeste, og som bestaar af en hyalin, saagodtsom fiberfri Masse, findes saavel forgrenede Bindevævsceller, som de tidligere omtalte isolerede, aflange, klare Celler med kornet Indhold. Disse ere her tilstede i temmelig stor Mængde. Men foruden de her nævnte Celler have vi iagttaget en Mangfoldighed af brunlige Legemer, som have en mere eller mindre Kolbeform, og som skyder Epithelet foran sig, saa de beklædt af dette rage frem i Rørets Lumen, Tab. IX, Fig. 38. Det er fornemmelig her de findes i stor Mængde, og de gruppere sig stundom saaledes, at de faa Udseende af Drueklaser. I Blærerne ere de sjeldnere og rage aldrig frem i dem, saaledes som i Rørets Hulhed. Man kan med Loupen iagttage dem som brunlige Punkter, der dels ligesom en Krands omgive Blærernes Udspring, dels staa spredte rundtom baade paa Røret og Blærerne. Disse brune Legemer dannes af et Agglomerat af brunlige Moleküler, uden at være omgivne af nogen Membran; de have forskjellig Størrelse og synes at have noget tilfælles med de Blodplasmaklumper, som vi have truffet paa baade i Tarmkanalens og Hudens Væv. De ere, saavidt vi have kunnet forfølge dem, ikke organiserede, og kunne visselig ikke betragtes som særegne functionelle Redskaber.

Det indre Bindevævslag støder umiddelbart til det indre Epithel. Dette danner i selve Røret flere Lag Cylinderceller, som bidrage til at danne de stærkt fremstaaende paalangs gaaende Folder, der iagttages paa Rørenes indre Flade; i Blærerne er der neppe mere end et Lag Celler.

De nu nylig beskrevne Lunger afvige i flere Punkter fra, hvad der hidtil er bekjendt om disse Organer hos Molpadiderne og Aspidochiroterne. Hos disse er den ene Lungestamme uden Karforgrening og fri, imedens den anden følger Tarmen, er bunden til denne, og erholder en Karforgrening fra dens Rygkar; men begge tage de Udspring fra Kloaken.

Hos *Trochostoma* er det helt anderledes. De udspringe fra Tarmen (Kloak mangler, men en Rectum træder i dennes Sted); den venstre Stamme ligger tæt til Tarmens

and is webbed to the two dorsal radial segments of the calcareous ring, viz. on the outer surface of their posterior prolation, by strong tendinous bands. These tubes with their numerous vesicles exhibit the same histological structure as the intestine; externally, they are invested with a vibratile peritoneal tunic and its epithelium, overlying which is a thin fibrillous layer of connective tissue, webbed to the muscular integument. The latter, which is composed of longitudinal and transverse fibres, constitutes an intricate network, having its meshes filled with coagulated sanguineous plasma; but whether this plasma be enclosed in a vascular ramification filling the meshes of the network, or whether it circulate freely through the layers of the muscular integument, is a question we are unable to decide.

Beneath the muscular layer, too, extends a tunic of connective tissue, the inner and broadest layer of which, consisting of a hyaline, almost fibreless substance, contains alike ramose cells of connective tissue and the bright, elliptic-shaped, isolated cells previously described, which are comparatively numerous here. But, exclusive of the above-mentioned cells, we have observed great numbers of brownish, more or less claviform corpuscles, that, invested with the epithelium, which they push, as it were, before them, project upwards into the lumen of the tube, Pl. IX, fig. 38. It is more particularly here that they occur in great numbers, and so grouped as sometimes to assume the appearance of clusters of grapes. In the vesicles, they are less numerous, and never project into them as they do into the hollow interior of the tube. Viewed under a lens, they appear like brownish points, some of which surround chaplet-like the origin of the vesicles; others lie scattered round the tube and the vesicles. These brown corpuscles are composed of an agglomeration of brownish molecules, without however being enveloped in a membranous covering; they vary in size, and have apparently something in common with the lumps of sanguineous plasma observed in the tissue of the intestinal canal and of the integument. So far as our observations extend, they are not distinguished by an organic structure, and cannot therefore be regarded as having a special functional character.

The inner layer of connective tissue is connate with the inner epithelial layer. The latter forms in the tube itself several layers of cylindric cells, which contribute to the formation of the strong, projecting, longitudinal folds observed on the inner surface of the tubes; in the vesicles there can hardly be more than one layer of cells.

The respiratory organs described above differ in several respects from what is yet known concerning them in the *Molpadidæ* and the *Aspidochirotæ*. In these animals, one of the respiratory stems is free, and without a vascular ramification; the other accompanies the intestine, to which it is attached, being furnished with a vascular ramification from its dorsal vessel; both however originate in the cloacum.

In *Trochostoma*, quite another arrangement is observed. The tubes have their origin in the intestine (there is no cloacum, its place being supplied by a rectum); the left

sidste nedstigende Slynge, uden at være bunden til den, og hverken den ene eller den anden staar i nogen Forbindelse med Karsystemet.

Det har været almindelig antaget, at disse forgrenede Rør tjene som Respirationsorganer, idet de skulle optage Søvandet fra Kloaken, og efter at have afgivet det fornødne Surstof til Blodet, skulde det igjen udstødes, tilsat med en Del af de for Blodet ubrugelige Stoffe.

Hos en hel Del Holothurider foregaar ogsaa en rhytmisk Udvidning og Sammentrækning af Kloakaabningen, hvorved Søvandet inddrages og udstødes; men om dette jages op igjennem Rørene og fylder de mangfoldige Blærer, der da skulde sammentrække sig for atter at støde Vandet ud, eller med andre Ord, om der virkelig i de nævnte Rør og Blærer foregaar en Diastole og Systole, saaledes som Tilfældet er med Lunger i Almindelighed, det tør være Tvivl underkastet. En saadan Tvivl har ogsaa til forskjellige Tider været reist; saaledes er Johannes Müller den første, der har ytret den Formening, at disse saakaldte Lunger neppe staa i Respirationens Tjeneste, da det forekom ham besynderligt, at kun den ene Stamme havde Blodkar, imedens den anden var uden Blodkarforbindelse med Tarmen. Han er tilbøielig til at antage dem for Appendices til Fordøielseskanalen, og sammenligner dem med Analblinderørene hos Asteriderne.

Gegenbauer[1] deler vistnok den samme Mening og henfører dem til Tarmkanalens Tilhængsorganer, idet han ytrer: "Omendskjøndt disse saakaldte Lunger — indre Aandedrætsorganer — med Hensyn til deres Funktion ere forskjellige fra de interradiale Blindrør paa Søstjernetarmen, saa komme de dog disse nær i morphologisk Henseende og synes at være en videre Udvikling af de hos Asteriderne forekommende meget simple Rør". Men hverken Johannes Müller eller Gegenbauer har, saa forekommer det os, kunnet levere noget fuldgyldigt Bevis, støttet paa rene Iagttagelser, for deres Mening, hvorfor de ogsaa opfordre Forskere til at skjænke disse Organer deres fulde Opmærksomhed.

Vi have paavist, at hos *Trochostoma,* hvor disse antagne Lungeapparater ere meget udviklede, udspringe de fra selve Tarmen uden nogen Karforbindelse med denne. Heldigvis have vi havt flere Exemplarer i forskjellige Udviklingsstadier at raade over, saa at Observationerne derved have vundet i Sikkerhed.

Hos et 10mm langt Individ, hvor intet Spor saaes til Generationsorganerne, fandt vi Rørene ikke meget udviklede; det høire dannede ved sit brede Udspring en tragtformig Forlængelse af Tarmvæggen, hvilken indtog omtrent en Trediedel af Dyrets Længde, og var aldeles opfyldt af det samme lerede Indhold, som den fuldproppede Tarm, Tab. VII, Fig. 11, *a.* Ved den øverste spidse Ende af Tragten blev Røret tyndt og næsten vandklart; men snart

[1] Gegenbauer. Grundriss der vergleichenden Anatomie. 2te Aufl. 1878, pag. 228.

tube, or tree, is placed close to the last descending convolution of the intestine, without however being webbed to it, and neither the one nor the other have any connexion whatever with the vascular system.

These ramose tubes have generally been regarded as performing the office of respiratory organs, the water being sucked up through them from the cloacum, and then, after it has given off the necessary amount of oxygen to the blood, ejected, with some admixture of substances eliminated from the blood.

In many Holothurians there is a rhythmic expansion and contraction of the cloacal opening, whereby the water is sucked in and ejected; but whether it be forced up through the tubes and fill the numerous vesicles, which in that case would, as in other respiratory organs, contract and expand with a regular alternate stroke — systole, diastole — to expel the aquiferous fluid, is doubtful. Indeed this is a question which has been frequently raised. Johannes Müller was the first to state that, in his opinion, these "lungs" could hardly perform the office of respiration; it struck him as strange, that one only of the respiratory tubes should be furnished with blood-vessels and the other have no circulatory connexion whatever with the intestine. He would regard them rather as appendices to the digestive canal, and compares them to the cæca-like anal tubes in the *Asteridæ.*

Gegenbauer[1] shares this view, regarding them as mere appendages of the intestinal canal. He expresses himself as follows: — "These 'lungs,' as they are termed — internal respiratory organs — do indeed, as to their function, differ from the cæca-like interradial tubes in starfishes, but morphologically they bear considerable resemblance to those organs, and would seem to be a further development of the very simple tubes in the *Asteridæ.*" But neither Müller nor Gegenbauer have, we think, furnished satisfactory proof, from autoptical observations, of the soundness of their hypothesis; indeed, they both call on naturalists to give these organs a full share of attention.

Now, we have shown that this respiratory apparatus originates in *Trochostoma,* which has it highly developed, on the intestine itself, without however having any vascular connexion with that organ. Fortunately, we have had before us several specimens, representing different stages of growth, which has given a more conclusive character to our results.

An example, 10mm in length, in which no trace of generative organs could be detected, had the tubes but slightly developed; the right tube formed at its origin a funnel-shaped continuation of the intestinal wall, occupying nearly a third of the length of the animal, and was stuffed full of the same clayey substance that distended the intestine, Pl. VII, fig. 11, *a.* At the superior acuminate extremity of the funnel, the tube became thin

[1] Gegenbauer. Grundriss der vergleichenden Anatomie. 2te Aufl. 1878, pag. 228.

udvidede det sig til en temmelig stor aflang Blære, fyldt med vandklart Fluidum, Fig. 11, *b*, blev saa smalt og rørformigt igjen, forsynet med enkelte, yderst smaa Blærer, og fortsatte saaledes sit Løb op til Kalkringen, hvorpaa det fæstede sig, Fig. 11, *c*; det laa ganske frit, uden nogen anden Forbindelse med Tarmen end ved dets tragtformige Udvidning. Det venstre Rør udsprang ved Siden af det høire, var yderst smalt, todelt og besat med enkelte smaa Blærer; det laa frit i Kropshulheden, kun bundet til Huden ved enkelte fine Traade, Fig. 11, *d*.

Hos et andet 20mm langt Individ vare heller ikke Generationsorganerne at opdage; men Rørene vare noget mere udviklede. Det høire tog sit Udspring ligeledes fra den sidste nedstigende Tarmslynges Væg med en tragtformig Udvidning, hvorved det fik Udseende, som om Tarmen paa dette Sted var opheftet, Tab. VII, Fig. 10, *a*. Røret steg nu opover, blev tyndere, og var besat med temmelig mange smaa Blærer, indtil det fæstede sig paa Kalkringen, Tab. VII, Fig. 10, *b*, *c*. Ikke alene den tragtformige Udvidning, men ogsaa den smalere Del af Røret, ja endog flere Blærer vare opfyldte med det samme Indhold, som fandtes i den fuldproppede Tarm. Det venstre Rør udsprang i samme Niveau paa Tarmen, som det høire, et Stykke fra dette, var kort, todelt, temmelig tykt, og forsynet med nogle større og mindre Blærer. Saavel Røret, som samtlige Blærer vare udfyldte af det lerede Tarmindhold, Fig. 10, *d*. Hos ingen af disse smaa Individer var der nogen Kloak; Tarmen gik lige ud til Halespidsen, og kun den yderste Del var bunden ved nogle stærkere Muskelbaand til Kroppens Vægge.

Paa disse Exemplarer viste det sig tydeligt nok, at de forgrenede Rør egentlig ikke er andet end udbugtede Forlængelser af Tarmen og høre denne til. Om noget Aandedræt kan her ikke være Tale: thi de vare enten ganske eller for en Del udfyldte af Tarmindholdet, som bestod af en temmelig fast Lermasse, og som forklares lettelig derved, at Aabningen fra Tarmen var særdeles vid, den indtog næsten hele den ene Tarmvæg. Der kan saaledes ikke være trængt Søvand op i disse Rør, og naar ikke destomindre flere Blærer vare fyldte af et næsten vandklart Fluidum, saa hidrører dette visselig fra, at der foregaar en Endosmose af Kropsvædsken.

Jo mere Individet er skredet frem i Udvikling, desto smalere bliver den tragtformige Udbugtning, indtil den endelig hos det udvoxne Dyr antager den tynde Rørform, hvis Forbindelse med Tarmen da foregaar igjennem en trang Aabning; nu findes ikke i Rørene eller deres Blærer noget af Tarmindholdet, men vel en næsten vandklar, lidt klæbrig Vædske, tildels lig den, som indeholdes i Kropshulheden, imedens Tarmen, hvorfra de have deres Udspring, kan være aldeles fuldproppet. De fyldte Rør med deres Blærer kunne saaledes ikke have deres Indhold fra ind-

and almost translucent; it soon however expanded into a rather large, elliptic-shaped vesicle, filled with a pellucid fluid, fig. 11, *b*, became again slender and tubular, exhibiting a few minute vesicles, and thus continued its course to the calcareous ring, on to which it was webbed, fig. 11, *c*; it lay quite free, having no connexion whatever with the intestine save through the funnel-shaped expansion. The left tube had its origin at the side of the right, was exceedingly narrow, bipartite, and furnished with a few small vesicles; it lay free in the perivisceral cavity, attached to the integument by a few slender filaments, fig. 11, *d*.

In another specimen, length 20mm, the generative organs could not be detected; but the tubes where somewhat more developed. As in the other example, the right tube originated on the wall of the last descending convolution of the intestine, and was furnished with a funnel-shaped expansion, giving to the intestine the appearance of being, as it were, hitched up at this point, Pl. VII, fig. 10, *a*. The tube now began to ascend and grow narrower, exhibiting a considerable number of vesicles, till it reached the calcareous ring, to which it was webbed, Pl. VII, fig. 10, *b*, *c*. Not only the funnel-shaped expansion, but also the narrower portion of the tube, nay several of the vesicles even, were full of the clayey substance found in the distended intestine. The left tube had its origin on the intestine, in breast of the right, but some distance from it, was short, rather thick, bipartite, and furnished with a few vesicles, varying in size. Both the tube itself and all of the vesicles were full of the clayey substance distending the intestine, fig. 10, *d*. In none of these small animals was there a cloacum; the intestine protended to the tip of the caudiform extremity, the outermost portion only being webbed to the walls of the body by a few strong muscular bands.

In these specimens it was evident that, in a strict sense, the ramose tubes are merely sinuous prolations of the intestine. As to their performing a respiratory office, that is quite out of the question; for they were either wholly or partially distended with the compact, clayey substance forming the contents of the intestine, which is readily explained by the fact of these ramose tubes passing into the latter through a remarkably wide opening, which occupied nearly the whole of one of the intestinal walls. Hence water cannot possibly be forced up into these tubes; true, several of the vesicles contained an almost limpid fluid; but an endosmose of the perivisceral fluid is sufficient to account for that.

The more advanced the stage of development attained by the animal, the more slender does the funnel-shaped expansion become, till, in full-grown individuals, it assumes the slender, tubular form, its connexion with the intestine being then effected through a narrow opening. Now, neither the tubes themselves nor their vesicles contain any of the substance that fills the intestine, but an almost pellucid, viscous fluid, bearing some resemblance to that in the perivisceral cavity, whereas the intestine, on the walls of which they originate, is sometimes wholly distended with fæcal matter.

strømmet Søvand, men maa have faaet det paa endosmotisk Vei, noget der jo er meget almindeligt for organiske Membraner. Kommer nu hertil, at de forgrenede Rør hos *Trochostoma* ikke ere forsynede med særegne Blodkar, formene vi, at de mangle alle Betingelser for at kunne faa Navn af Lunger.

Det forekommer os, at de foreliggende Kjendsgjerninger paa det Bestemteste maa fraskrive disse Organer al Ret til at ansees for at staa i Aandedrættets Tjeneste, men at de meget mere maa anses som Afsondringsorganer, der tilhøre Tarmen, og forsaavidt formene vi for *Trochostomas* Vedkommende at have bevist Rigtigheden af Johannes Müllers og Gegenbauers Antagelse, den nemlig, at de saakaldte Lunger ere analoge Organer til de interradiale Blindrør hos Asteriderne. Men forholder det sig saa hos Slægten *Trochostoma,* saa er der liden Grund til at antage, at Forholdet er anderledes for de selvsamme Organer hos de øvrige Slægter af Lunge-Holothuridernes store Gruppe. Vort Dyr staar unægtelig paa et temmelig lavt Trin i Familien og tør derfor ogsaa i phylogenetisk Henseende have sin Interesse.

The tubes with their vesicles cannot therefore derive their contents from an influx of sea-water; the presence of the fluid must be traced to endosmotic action, which indeed is very frequent in organic membranes. Moreover, the ramose tubes in *Trochostoma* are not even provided with special blood-vessels, and hence, we think, they fail to exhibit any one of the features that would entitle them to the name of respiratory organs.

The facts we have adduced furnish, in our opinion, the strongest presumptive evidence that these organs are nowise subservient to respiration, but should rather be regarded as secretory organs proceeding from, and belonging to, the intestine; and hence, so far at least as concerns the genus *Trochostoma,* we believe to have substantiated the correctness of Johannes Müller's and Gegenbauer's assumption, viz., that these "lungs" are organs analogous to the interradial cæca-like tubes in the *Asteridæ.* But if this be the case with *Trochostoma,* the function of the selfsame organs in other genera belonging to the great group of lung-respiring Holothurians must surely be identical. The animal here described ranks low in the family *Molpadidæ,* and may therefore, phylo-genetically, prove an interesting acquisition.

Det indre Skelet.

Kalkringen dannes af 10 Stykker, 5 radiale og 5 interradiale, hvilke ere sammenbundne med en stærk Bindevævsmasse, Tab. VII, Fig. 5. Hos unge Dyr er denne temmelig svag, saa at Stykkerne med Lethed kunne skilles fra hverandre, imedens Forbindelsen hos udvoxne Dyr er saa stærk, at den kun kan hæves ved Kniven eller ved Hjælp af en koncentreret Kalilud.

Radialstykkerne ere 5^{mm} lange, 3^{mm} brede paa Midten, og ere ikke ganske symetriske, forsaavidt det ene kan være lidt smalere og lidt skjævere end det andet, Tab. VII, Fig. 5, *a, a, a.* Hvert Radialstykke har en bredere Del, som danner det egentlige Legeme (Corpus), Fig. 5, *b, b,* 6, *b,* og en Forlængelse (Processus), Fig. 5, *a, a,* 6, *a.* Legemet har en udvendig og en indvendig Flade, to Sideflader og en øverste Rand. Den udvendige Flade er lidt konvex mod Siderne og forsynet med 3 fremspringende Kamme (Cristæ); de indtage hele Fladens Længde og divergere lidt nedad, Fig. 5, *c.* Den midterste Kam er den mest fremragende; Sidekammene udgjøre egentlig Siderandene, og blive først tydelig fremspringende, idet den ene Rand føies til en anden fra det tilsvarende Radialstykke. Imellem disse tre Kamme ere to temmelig dybe Furer, hvoraf den ene — den udvendige — lukkes foroven og danner her den skeformige Grube, hvori inserer sig den fælles Tendo for to Længdemuskler, Fig. 5, *d, d.* I den indvendige Fure, der altsaa findes mellem Midtkammen og den venstre (indvendige) Kam, ligger en Ampulla, Fig. 5, *e.* Den venstre Kam rager lidt over den øvre Rand, saa at denne derved faar et halvmaaneformigt Indsnit, Fig. 6, *c.* Den indvendige Flade er lidt konkav mod Si-

The Calcareous Skeleton.

The calcareous ring is composed of 10 segments — 5 radial and 5 interradial, webbed together by a compact mass of connective tissue, Pl. VII, fig. 5. In young examples, the tissue is rather fragile, and the segments readily admit of being parted, but in full-grown individuals they adhere so tenaciously that a knife, or a concentrated solution of potash, is needed to dissolve the connexion.

The radial segments are 5^{mm} long, 3^{mm} broad in the middle, and not quite symmetrical, some being a trifle narrower and more oblique than others, Pl. VII, fig. 5, *a, a, a.* Each of the radial segments has a broad part, which constitutes the body (corpus), fig. 5, *b, b,* 6, *b,* and an elongation, or process, fig. 5, *a, a,* 6, *a.* The body has an outer and an inner surface, two lateral surfaces, and an upper margin. The outer surface — slightly convex towards the sides — is furnished with 3 projecting combs *(cristæ),* which occupy the whole length of the surface, diverging slightly downwards, fig. 5, *c.* The middle comb projects most; the lateral combs constitute, strictly, the lateral margins, and do not assume a projecting appearance till one margin unites with another from the corresponding radial segment. Between these three combs extend two rather deep grooves, one of which — the outer groove — is closed above, forming a spoon-shaped socket, from which springs the tendon common to two of the longitudinal muscles, fig. 5, *d, d.* In the inner groove, extending accordingly between the middle and the left (the inner) combs, is seen an ampulla, fig. 5, *e.* The left comb projects slightly above the upper margin, producing therein a lunate incision, fig. 6, *c.* The inner surface is slightly concave towards the sides, and exhibits

derne, har i Midten to ophøiede Linier, der ere noget divergerende mod den øverste Rand, og imellem hvilke findes en temmelig dyb Fure, der optager en af Vandkarsystemets 5 Hovedkanaler, Fig. 6, *d*. Paa hver Side af disse ophøiede Linier findes flere dybe Impressioner, der tjene til Insertion for de Muskelbaand, der binde Svælget til Kalkringen. Sidefladerne ere brede foroven og lidt ujevne. Den øverste Rand har egentlig to Fremstaaenheder, imellem hvilke findes et halvmaaneformigt Indsnit, der ovenfor er beskrevet, Fig. 6, *c*.

Den forlængede Del (Processus) er en Fortsættelse af Legemet og har en Bøining mod Svælget; den er omtr. 1^{mm} lang, bredere foroven og ender forneden i en spaltet Spids, Fig. 5, *a*, *a*. 6, *a*. Den udvendige Flade er glat, og her insererer sig paa de to dorsale Radialstykker det lange, forgrenede Tarmtilhæng. Paa den indvendige Flade sees Fortsættelsen af de paa Legemets indvendige Flade beskrevne ophøiede Linier og den dybe Fure. Til den spaltede Spids (Radialstykkets nederste Ende) er Vandkarsystemets Ringkanal fæstet, Tab. VII, Fig. 8, *b*.

Interradialstykkerne ere 4^{mm} lange og 2.5^{mm} brede paa Midten; de ere lidt bredere foroven, smalere forneden. Fig. 5, 7. Den udvendige Flade er ligesom paa Radialstykkerne lidt konvex til Siderne og forsynet med 3 Længdekamme, hvoraf den midterste, der er den største, deler sig nedimod den nederste Rand, hvorved der fremkommer et triangulært, lidt fordybet Spatium, Fig. 7, *a*. Imellem de trende Kamme findes to dybe Render, som optage to Ampuller, Fig. 7, *b*. Den indvendige Flade er temmelig glat og konkav mod Siderne. Den øverste Rand har 3 Fremstaaenheder, hvoraf den midterste er den største; imellem disse findes 2 halvmaaneformige Indsnit, Fig. 7, *c*. Den nederste Rand danner et halvmaaneformigt Indsnit, Fig. 7, *d*.

Naar samtlige Radial- og Interradialstykker ere sammenbundne, har Kalkringen en lidt aflang, ligesom sammentrykt Figur; dens øverste Rand er krenuleret af 15 Takker, og den nederste har 5 noget udadvendte Forlængelser, Tab. VII, Fig. 5. Til disse er Vandkarsystemets Ringkar bundet ved Bindevæv, ligesom Perisomet er fæstet saavel til Takkerne paa den øverste Rand, som til de fremspringende midterste Kamme.

Vandkarsystemet.

Vandkarringen, Tab. VII, Fig. 8, *e*, slynger sig i Bugtninger omkring Svælget og er ved et stærkt Bindevæv bundet til Spidserne af Radialstykkernes forlængede Dele, Tab. VII, Fig. 8, *b*. Fra dens forreste Del udgaa 5 Hovedkar, der løbe i Furen paa Radialstykkernes indre Flade, bundet dertil ved Bindevæv, Fig. 8, *f*. Ved den øverste Ende af nævnte Stykke deler hvert Kar sig i 4 Grene, hvoraf den, der kan betragtes som den lige Fortsættelse af Hovedkarret, bøier sig over mod Tendoen af Længdemusklerne og fortsætter nu i lige Linie sit Løb

in the middle two linear eminences, diverging slightly towards the upper margin, and between which extends a rather deep groove, for the reception of one of the 5 principal canals of the aquiferous system, fig. 6, *d*. On either side of these linear eminences are seen several deep depressions, for the insertion of the muscular bands that web the œsophagus to the calcareous ring. The lateral surfaces are broad above, and slightly rugose. The upper margin has two small prominences, between which there is a lunate incision, similar to that mentioned above, fig. 6, *c*.

The elongated portion, or process, is a continuation of the body, and makes a bend near the œsophagus; it is about 1^{mm} long, broadest above, and terminates below in a cleft point, fig. 5, *a*, *a*; 6, *a*. The outer surface is smooth, and here, on the two dorsal radial segments, is inserted the long, ramose intestinal appendix. Along the inner surface extends the continuation of the linear eminences, and of the deep groove described above. To the cleft point (the lower extremity of the radial segment) is attached the annular canal of the aquiferous system, Pl. VII, fig. 8, *b*.

The interradial segments are 4^{mm} long, and 2.5^{mm} broad in the middle; they are a trifle broader above than below, fig. 5, 7. The outer surface, as on the radial segments, is slightly convex towards the sides, and furnished with 3 longitudinal combs; that in the middle, which is the largest, divides near the lower margin, thus producing a triangular, slightly depressed space, fig. 7, *a*. Between the three combs extend two deep channels, containing each an ampulla, fig. 7, *b*. The inner surface is comparatively smooth, and concave towards the sides. The upper margin has 3 prominences, that in the middle being the largest; between these prominences are seen two lunate incisions, fig. 7, *c*. In the lower margin there is likewise a lunate incision, fig. 7, *d*.

When the radial and interradial segments are all united, the calcareous ring has a slightly oval and, as it were, compressed form; the upper margin is crenulated with 15 spikes, and the lower has 5 prolations, inclining slightly outwards, Pl. VII, fig. 5. To these prolations is webbed the water-vascular ring, and the perisom, too, is attached both to the spikes on the upper margin and to the medial projecting combs.

Aquiferous System.

The water-vascular ring, Pl. VII, fig. 8, *e*, winds in sinuous curves round the œsophagus, and is webbed by a strong band of connective tissue to the extremities of the elongated portions of the radial segments, Pl. VII, fig. 8, *b*. From its anterior part proceed 5 ambulacral vessels, which extend along the groove on the inner surface of the radial segments, to which they are webbed by connective tissue, fig. 8, *f*. At the upper extremity of the segments, each vessel divides into 4 branches, that which may be regarded as a direct continuation of the vessel (the longitudinal vessel) bending over towards

imellem hvert Par af Længdemusklerne, Fig. 8, *g*. De tre øvrige ere meget korte og gaa til hver sin Tentakel. Fra hver af Tentaklerne udgaar en meget lang cylindrisk og i den bagerste Ende tilspidset Blindsæk (Ampulla), der ligger paa Kalkringens udvendige Flade i den tidligere beskrevne Fure, og rager 2—3^{mm} nedenfor Kalkringens Rand, Fig. 8, *h*.

De 5 Længdekar afgive under deres hele Løb en Mængde Sidegrene, der ende blindt i Huden.

Ringkanalen dannes af en tynd, halvgjennemsigtig, seig Membran, som er sammensat af flere Hudlag. Udvendig er den beklædt af det flimrende Peritoneum, indenfor dette er et tyndt, hyalint Bindevævslag, hvori sees spredte Fibre, Slimceller og forgrenede Celler; hertil slutter sig en Muskelhud, bestaaende af cirkulære Muskelfibre, paa hvilken et cilierende Epithel fæster sig. De fra Ringkanalen udgaaende Kar, ligesom Ampullerne, have en lignende histologisk Sammensætning. Som Tilhæng til Vandkarsystemet hører den Poliske Blære og Stenkanalen.

Den Poliske Blære er temmelig stor, hænger frit i Kropshulheden, har Ægform og en meget lang Stilk, som er fæstet til Ringkarret. Tab. VII. Fig. 3, *h*. Den Poliske Blære med dens Stilk dannes af et udvendigt og indvendigt flimrende Epithel, imellem hvilket findes et temmelig fast Bindevæv og et Muskellag, som bestaar af Længdefibre. Bindevævet danner to Lag, et ydre, der er stærkt fibrillært, og hvor Fibrene krydse hverandre i mange Retninger; det indre er hyalint og har en stor Mængde af de saakaldte Slimceller; forgrenede Celler vare ikke til at opdage. Indholdet saavel af Ringkanalen, som af de fra den udgaaende Kar, samt den Poliske Blære, er af samme Beskaffenhed. Det er en tyndt flydende, lidt klæbrig Vædske, næsten vandklar, spillende lidt i det Rødlige, og hvori flyder en Mængde dels klare, næsten runde Celler, forsynede med en Kjerne og flere Kjernelegemer, dels Celler med et rødligt Skjær, og endelig Celler, hvori saaes foruden Kjerne en eller flere stærkt lysbrydende Kalkkorn eller Kalkkrystaller. Tab. VIII. Fig. 35, *a, a*. Desforuden saaes en hel Del frie Krystaller af meget forskjellig Form, og hvoraf flere havde en mørk vinrød Farve og vare saagodtsom ugjennemsigtige, Fig. 35, *b, b*. Ved at tilsætte Eddikesyre viste det sig, at saavel de frie Krystaller, som de i Cellerne indesluttede, bestode af kulsur Kalk.

Stenkanalen er lang, tynd som en fin Sytraad, glindsende hvid, udgaar fra Ringkanalen paa Rygsiden og løber næsten horizontalt — lidt skraat opad og udad — mod den indre Kropsvæg, hvortil den er fæstet ved Randen af en Længdemuskel og ganske nær Udførselsgangen for Kjønsorganerne. Den ligger omgivet af et Bindevæv, som er en

the tendon of the longitudinal muscles, and then passing straight on its course between each pair of the latter, fig. 8, *g*. The three remaining branches are exceedingly short, and proceed each to a tentacle. From each of the tentacles proceeds an exceedingly long, cylindric, and at the posterior extremity, acuminate cæcum (ampulla), which is placed on the outer surface of the calcareous ring, in the groove described above, and projects from 2^{mm} to 3^{mm} below the margin of the ring, fig. 8, *h*.

The 5 longitudinal vessels send off on their course numerous lateral branches, terminating cæcally in the skin.

The annular canal consists of a thin, semi-translucent, tough membrane, composed of divers tegumentary layers. Externally, it is invested with the vibratile peritoneum, beneath which extends a thin hyaline layer of connective tissue, in which are seen scattered fibres, and mucous and ramose cells; connate with this layer is a muscular tunic, consisting of circular muscular fibres, webbed to a ciliated epithelium. The vessels proceeding from the annular canal, as also the ampullæ, exhibit the same histological structure one as the other. As appendages to the aquiferous system must be regarded the vesicle of Poli and the sand-canal.

The vesicle of Poli, which is rather large, depends freely in the perivisceral cavity, has an ovate form, and a very long stem webbed to the annular vessel, Pl. VII, fig. 3, *h*. The vesicle of Poli, with its stem, consists of epithelial layers, ciliated externally and internally, between which extends a layer of rather compact connective tissue, and a muscular layer composed of longitudinal fibres. The connective tissue consists of two layers, an outer layer, which is exceedingly fibrillous, the fibres interlacing in many directions; the inner layer is hyaline, and is furnished with a large number of mucous cells, as they are termed; ramose cells we failed to detect. The contents of the annular canal, as also of the vessels proceeding from it, and of the vesicle of Poli, are of the same character, viz. a somewhat viscous, fluid substance, almost limpid, with a faint reddish tinge, in which numbers of cells are seen floating, some bright, almost circular in form, and furnished with a nucleus and several nucleoli, others tinged with red, and some containing, exclusive of the nucleus, one or more highly refractive calcareous granules, or calcareous crystals, Pl. VIII, fig. 35, *a, a*. Moreover, we also observed a large number of free crystals, varying greatly in form, some of which were of a dark vinous red and very nearly opaque, fig. 35, *b, b*. On treating them with acetic acid, both the free crystals and those enclosed in the cells were found to consist of carbonate of lime.

The sand-canal is long, slender as a hair, and lustrous white; it springs from the annular canal, on the dorsal surface, extending almost horizontally towards the inner wall of the body, to which it is attached at the margin of a longitudinal muscle, and in close proximity to the oviducal canal. It is wholly invested with a membrane —

Forlængelse af den Bindevævsmembran, Tab. VIII, Fig. 14, *a*, som bidrager til at danne Svælgsinus, og dens udvendige Ende, der er bundet til Kropsvæggen, er afrundet, Tab. VIII, Fig. 14, *b*, 15, *b*. Omtrent 1^{mm} udenfor denne afrundede Ende sidder Madreporpladen, som en næsten rund, noget flad Knop, og indtager kun den øverste Flade af Stenkanalen, imedens dens Rande rage et godt Stykke udenfor denne, Tab. VIII, Fig. 14, *c*, 15, *c*. Der hvor Stenkanalen udmunder i Ringkanalen, udvider den sig tragtformig.

Stenkanalen, Tab. VIII, Fig. 14, *d*, 15, *a*, dannes af et meget fast Bindevæv, der udvendig er beklædt med flimrende Epithel, og indvendig, nemlig paa Hulhedens Vægge, findes ligeledes en Epithelialbeklædning med lange Cilier, der rage et godt Stykke ind i selve Lumenet, som uden at være afdelt gaar igjennem hele Længden. Selve Hulheden omgives af Kalkringe, der dannes af sammenflettede Kalkgrene, Tab. VIII, Fig. 15[1]. Fra hver Rings saavel udvendige som indvendige Rand udgaa 5—6 uregelmæssige Forlængelser, der ligeledes ere sammensatte af Kalkfletninger med deres Masker; de paa den udvendige Rand (den, der vender mod Kropsvæggen) ere kortere, end de paa den indvendige Rand. Den ene Ring støder tæt til den anden paa omtrent den halve Længde af Stenkanalen, saa at det her ser ud, som om det var et eneste Kalknet; paa den øvrige Del derimod slutte Ringene ikke saa tæt til hverandre, ja paa enkelte Steder ligger der kun en halv Ring eller en lille Kalkplade, som dækker Stenkanalen.

Madreporpladen har en mæneandrisk Overflade, Tab. VIII, Fig. 14, 15, *c*, bestaar af en Mængde aflange Furer, i hvis Bund findes mange smaa Aabninger, der føre ind til Kanaler, som aabne sig i en Hulhed, der paa dette Sted egentlig er en Udbugtning af Stenkanalen. Der nemlig, hvor Madreporpladen har sit Sæde, udvider den øverste Væg af Stenkanalen sig sækformig, og i denne sækformige Udvidning udmunder de omtalte Kanaler, der løbe i en horizontal Retning hen mod Hulheden. Madreporpladen er beklædt med et cilierende Epithel, der strækker sig ned ikke alene i Furerne, men ogsaa i Kanalerne.

Stenkanalen med dens Madreporplade frembyder hos Slægten *Trochostoma* flere Punkter, hvori den væsentlig adskiller sig fra, hvad der om dette Organ er kjendt hos de hidtil undersøgte Holothurider. Hos disse er jo altid Enden, forsaavidt der kun er en, eller Enderne, hvor de ere flere, forsynede med en Madreporplade, og rage frit ud i Kropshulheden, imedens Stenkanalens ydre Ende hos *Trochostoma* ikke er forsynet med Madreporplade og heller ikke er fri, men fastvoxet til Kropsvæggen. Madreporpladen sidder nemlig paa Kanalen, et godt Stykke fra Enden.

Det synes, som om Stenkanalen hos *Trochostoma* for en Del har beholdt Holothuridernes Larvestadium, hvor den nemlig ikke alene er fastvoxet til Huden, men ved en Aabning i denne korresponderer med det omgivende Søvand.

a continuation of the membrane, Pl. VIII, fig. 14, *a*, that contributes to the formation of the pharyngeal sinus, and its posterior extremity, webbed to the wall of the body, is rounded off, Pl. VIII, fig. 14, *b*; 15, *b*. About 1^{mm} in advance of this convex extremity, is the madreporic body, an almost circular, flattish knob, occupying only the upper surface of the sand-canal, whereas its margin projects a considerable distance beyond it, Pl. VIII, fig. 14, *c*; 15, *c*. At the point where the sand-canal opens into the annular canal, it has a funnel-shaped expansion.

The sand-canal, Pl. VIII, fig. 14, *d*; 15, *a*, consists of exceedingly firm connective tissue, invested externally with vibratile epithelium; internally, too, viz. on the walls, there is a ciliated epithelial tunic, projecting a considerable distance into the lumen, which extends uninterruptedly throughout the entire length of the stem. Calcareous rings, composed of interlaced calcareous branches, annulate the hollow interior, Pl. VIII, fig. 15.[1] Both from the outer and inner margins of each ring proceed 5 or 6 irregular prolations, composed in like manner of calcareous reticulations; those on the outer margin (that facing the wall of the body) are shorter than those on the inner. The rings approximate, one to the other, for about half the length of the sand-canal, giving the appearance of calcareous network; on the remainder of the stem the rings are less closely arranged, nay in some places is seen only half a ring, or a small calcareous plate covering the sand-canal.

The madreporic body has a meandrian surface, Pl. VIII, fig. 14; 15, *c*, exhibiting a number of oval grooves, in the bottom of which are numerous minute openings, leading to canals that disembogue into a hollow space, which must be regarded as a sinuous depression in the sand-canal; for in the spot where the madreporic body is located, the upper wall of the sand-canal expands in the form of a sac, and into this sac-like expansion the said canals are seen to open, after extending in a horizontal direction to the hollow space described above. The madreporic body is invested with a ciliated epithelial tunic, extending not only down into the grooves, but also into the canals.

In the genus *Trochostoma*, the sand-canal with its madreporic body presents divers features that differ essentially from those distinguishing that organ in all other known Holothurians. The latter have the extremity or extremities of the sand-canal, according as there are one or more, invariably furnished with a madreporic body, and project, quite freely, into the perivisceral cavity, whereas in *Trochostoma* the outer extremity of the sand-canal is not furnished with a madreporic body; neither is it free, being connate with the wall of the body. The madreporic body in this animal occurs on the canal, some distance from its extremity.

In *Trochostoma* the sand-canal has retained apparently the characteristics peculiar to the larval stage of Holothurians, being not only connate with the integument, but communicating, through an aperture in the latter, with

Saalænge dette Stadium i Udviklingen vedvarer, er endnu ingen Madreporplade dannet; efterhaanden som Aabningen i Huden lukkes, udvikler Madreporpladen sig, og da nu Stenkanalens ydre Ende vedbliver at være fastvoxet til Huden, kan Madreporpladen ikke udvikle sig der, hvor den ellers pleier at findes hos Holothuriderne, men maa fremstaa paa et andet Sted af Stenkanalen, som jo ogsaa virkelig er Tilfældet hos *Trochostoma.*

Stenkanalens histologiske Bygning afviger ogsaa noget fra Holothuridernes og synes at nærme sig mere Asteridernes, forsaavidt den er kjendt, idet nemlig det indre flimrende Lumen er omgivet af tæt tilsluttende Kalkringe, der dog ikke som hos Asteriderne sende Forlængelser ind i selve Hulheden, hvorved denne bliver mere kompliceret, men kun tjener som Støtte for det enkelte Lumen. Ogsaa Madreporpladen danner et Slags Overgangsled imellem Holothuridernes og Asteridernes, men synes at nærme sig mest til de sidstes Madreporplade.

Vi have tidligere kun i Forbigaaende nævnt Tentaklerne; vi skulle nu omtale dem noget nærmere. Som alle Tentakler ere de hule cylindriske Rør, som paa deres øverste frie Ender ere tredelte, Tab. VII, Fig. 4. Den midterste Papille er den største og bredeste; Sidepapillerne ere smalere og næsten lancetformige. Tentaklerne ere yderst korte og rage knapt 2^{mm} over Mundskiven. Deres ydre Flade er beklædt med en yderst tynd, vandklar Cuticula, under hvilken et enkelt Epithellag, bestaaende af Cylinderceller, findes. Indenfor dette sees en temmelig fast Bindevævshud, hvis Fibriller krydse hverandre i alle Retninger, og i hvis intermediære Substants ere indleirede en Mængde kugleformige Kalkkorn, der ligge meget tæt sammen uden dog at berøre hverandre, og som tidligere ere beskrevne. Til denne Bindevævshud fæster Muskelhuden sig, som dannes af cirkulære og langsgaaende Fibre, hvilke tildels anastomosere med hverandre.

Indenfor Længdemuskellaget iagttages et hyalint Bindevæv, der er temmelig smalt, indeholder en stor Mængde aflange kornede Celler (Sempers Slimceller) og enkelte forgrenede Bindevævslegemer. Til dette Bindevævslag fæster sig Tentakelkarret med sit flimrende Cylinderepithel, hvis Cilier rage ind i Hulheden. Som tidligere nævnt ligge disse yderst smaa Tentakler næsten skjulte i de før beskrevne aflange Gruber, og kunne saaledes vanskeligen tjene som Bevægelsesorganer, og heller ikke synes de paa Grund af deres Lidenhed at kunne benyttes til Gribeorganer eller til at føre Føden hen til Mundaabningen. En Funktion maa de imidlertid have, men hvilken denne nu er, vide vi ikke.

Kropshulheden er overalt beklædt med et flimrende Epithel og er ved Vandkarringen forsaavidt afbrudt, som denne danner Grændsen imellem Svælgsinus og den egentige Kropshulhed. Idet Ringkanalen, som ovenfor angivet,

the water in which the animal is immersed. During this stage of development the madreporic body does not exist; it begins to form as the opening in the skin gradually closes; but the outer extremity of the sand-canal continuing to be connate with the integument, the madreporic body cannot develop where it is commonly observed in Holothurians; it must needs form on some other part of the sand-canal, which indeed is the case with *Trochostoma.*

The histological structure of the sand-canal differs somewhat, too, from that in other Holothurians, approximating apparently that in the *Asteridæ,* — so far at least is known, — the inner vibratile lumen being furnished with tight-fitting calcareous rings, from which, however, unlike those in the *Asteridæ*, no prolations extend into the cavity itself; they merely serve to strengthen the particular lumen they encircle. Moreover, the madreporic body constitutes a kind of transition link between the Holothurians and the *Asteridæ,* but would seem to bear most resemblance to the madreporic body in the latter family.

We have already occasionally mentioned the tentacles; we will now proceed to describe them. They consist — as do all tentacles — of hollow, cylindric tubes, which, at their free extremities, are tripartite, Pl. VII, fig. 4. The middle papilla is the largest and broadest; the lateral papillæ are narrower and almost lanceolate. These tentacles are exceedingly short, projecting at most 2^{mm} above the oral disk. Their outer surface is invested with an exceedingly thin transparent cuticle, under which extends a single epithelial layer, consisting of cylindric cells. Underneath the latter is seen a layer of comparatively firm connective tissue, with fibrils interlacing in all directions, and having, embedded in its intermediary substance, numbers of globose calcareous granules, very closely arranged, but not contiguous, similar to those already described. To this layer of connective tissue is webbed the muscular integument, consisting of circular and longitudinal fibres, some of which anastomose one with the other.

Underneath the longitudinal muscular layer is seen a layer of hyaline connective tissue, comparatively narrow, and containing a large number of oval granulous cells (Semper's mucous cells) and a few ramose corpuscles of connective tissue. To this layer of connective tissue is attached the tentacular vessel, with its vibratile cylindric epithelium, the cilia of which project into the cavity. As previously stated, these minute tentacles are almost concealed in the elliptic-shaped cavities described above: and hence they can hardly serve as locomotory organs, nor, being so small, are they, it would seem, adapted for seizing prey or conveying food to the mouth. Some function they must however have, but what that function is, we are unable to state.

The perivisceral cavity, invested over the whole of its surface with vibratile epithelium, is intersected by the water-vascular ring, inasmuch at least as the latter constitutes the boundary between the pharyngeal

fæster sig til Radialstykkernes Forlængelser, dannes 5 Aabninger, som føre ind til Svælgsinus, og hvorigjennem altsaa denne korresponderer med Kropshulheden.

Vi omtalte under Beskrivelsen af de ydre Charakterer 15 rørformige Forlængelser, som udgjorde endel af Mundskiven, og som bidroge til at danne Hjulformen. Disse Forlængelsers Hulhed staar i Forbindelse med Kropshulheden igjennem 15 yderst smaa halvmaaneformige Aabninger, der findes ved den øverste Rand af Kalkringen. Forlængelserne vare fyldte med Kropshulhedens Indhold og kunde udspændes og falde sammen, alt eftersom Kroppen svulmede op eller trak sig sammen. Dette er en Særegenhed ved Slægten *Trochostoma*, hvortil vi ikke kjende noget Analogon.

Blodkarsystemet.

Tarmens Rygkar tager sit Udspring i den Fure, som adskiller Mave fra Tarm med en Mængde yderst fine Grene, der forene sig til en meget tynd traadformig Stamme; naar denne er kommen et Stykke ned paa Tarmens nedstigende Del, tiltager den i Tykkelse og afgiver en Gren, der er temmelig kort og meget snart forener sig igjen med Hovedstammen, som nu er bleven tykkere og sender en Mængde Grene, foruden ind i Tarmvæggene, ogsaa til det netformige Mesenterium. Karret, der altid ligger tæt til og ved Siden af Mesenteriet, tiltager alt mere og mere i Tykkelse, indtil den øverste Del af Tarmens opadstigende Slynge, hvor det begynder at aftage i Tykkelse, saa at det paa den sidste nedstigende Del bliver tyndere og tyndere, indtil det ender yderst fint (knapt synbart ved stærk Loupe) i den nederste Del af Rectum, et Par Millimeter fra Analaabningen. Rygkarret danner altsaa intet saakaldet Undernet, ligesaalidt som det afgiver nogen Gren til Tarmtilhængene (Respirationstræet).

Bugkarret tager Udspring paa Tarmens Bugflade, ligeledes med mangfoldige fine Grene, der samle sig til en enkelt tynd Stamme, som bliver tykkere et Stykke ned paa Tarmen, hvor den afgiver 3—4 temmelig tykke Grene, som gaa over til Bugkarret paa Tarmens opadstigende Del, med hvilket de anastomosere, og danne her 3—4 Broer, Tab. VII, Fig. 3, *i*. Desforuden afgive disse 3—4 Grene atter en eller to Smaagrene, som anastomosere med hverandre, og hvorved et Slags stormasket Net opstaar. Bugkarret løber langs Tarmens hele Bugflade lige ned til Enden af Rectum. Det aftager betydeligt i Tykkelse paa den sidste nedstigende Del af Tarmen, Fig. 3, *i*, men afgiver overalt

sinus and the true perivisceral cavity. As before stated, the annular canal is webbed to the prolations that issue from the radial segments, 5 openings leading to the pharyngeal sinus being thus formed, through which accordingly the latter communicates with the perivisceral cavity.

When describing the external characters of the animal, we called attention to 15 tubular prolations constituting part of the oral disk, and contributing to produce the rotate form. The hollow interior of the tubes communicates with the perivisceral cavity through 15 minute lunate openings, on the upper margin of the calcareous ring. These tubular prolations, which were filled with the contents of the perivisceral cavity, expand and collapse according as the animal distends or contracts its body. This is a feature peculiar to the genus *Trochostoma*, of which, so far as we are aware, no analogue exists.

Circulatory System.

The dorsal vessel of the intestine has its origin in the groove separating the stomach from the intestine by a number of most delicate branches, which, uniting, constitute an exceedingly slender filiform stem; on reaching some distance down on the descending convolution of the intestine, this stem increases in thickness, and sends off a branch, — rather short, — with which however it reunites; moreover, from the stem, which has now become considerably thicker, proceed numerous ramifications, not only to the walls of the intestine, but also to the reticulated mesentery. The dorsal vessel, which always occurs close to, and at the side of, the mesentery, continues increasing in thickness till it reaches the upper portion of the ascending convolution of the intestine, where it begins to diminish, becoming more and more slender on the remaining portion of the descending convolution, and terminating exceedingly delicate (hardly perceptible when viewed under a powerful lens) in the lower portion of the rectum, one or two millimetres from the anal opening. Hence the dorsal vessel does not form "a wonder-net" (rete mirabile), as it is termed, nor send off any branch or ramification to the intestinal appendices (the respiratory tree).

The ventral vessel has its origin on the ventral surface of the intestine, furnished in like manner with numerous branchlets, which unite together, forming one slender stem, which gets thicker some distance down on the intestine, where it sends off 3 or 4 rather thick branches, that proceed to the ventral vessel on the ascending portion of the intestine, with which they anastomose, forming here 3 or 4 bridge-like commissures, Pl. VII, fig. 3, *i*. Moreover, these thick branches send off one or two subsidiary branchlets, which anastomose one with the other, producing a kind of wide-meshed network. The ventral vessel passes along the entire ventral surface of the intestine to

en Mængde Sidegrene til Tarmen, hvortil det er bundet ved Bindevæv.

Imellem Ryg- og Bugkarret er i Tarmvæggene et intermediært Karnet, hvorved de anastomosere med hinanden. Hvor disse to Hovedkar tage deres Udspring, der dannes af de yderst fine Kar, hvormed de tog deres Begyndelse, et Karkomplexus, som omgiver Tarmen. Fra dette Karnet synes at udgaa Mavens saavel Ryg- som Bugkar. Vi sige synes; thi saa har det forekommet os paa de Præparater, vi have havt til vor Raadighed, omendskjønt dette ikke stemmer overens med Sempers Angivelser, der støtte sig til flere vellykkede Injectioner, og som gaa ud paa at bevise, at der ingen direkte Forbindelse er imellem Mavens og Tarmens Blodkar.

Rygkarret er temmelig fint, men bliver tykkere opimod Ringkanalen, hvor det afgiver en Gren til denne, efterat det tidligere har sendt flere Grene til Kjønsorganerne. Fra Rygkarret udgaar en Mængde Tvergrene, som forbindes med korte perpendikulære Smaagrene, hvorved et smukt Maskenet med store aflange paatversliggende Masker fremkommer.

Bugkarret forholder sig ganske paa lignende Maade, og danner ligeledes et stormasket Net, der anastomoserer med Rygkarrets, saa at Maven er omspændt af et rigt Karnet, Tab. VII, Fig. 8, *i*. Hvorvidt Karret til Ringkanalen gaar ind i denne, saa at Blodet blander sig med dens Indhold, kunne vi ikke afgjøre.

Fra de forreste Ender af Mavens Ryg- og Bugkar danner sig en rig Karfletning, der ligger under Ringkanalen og omgiver Svælget; det er dette Karplexus, som Semper kalder Svælgkruset. Denne ringformige Karfletning udsender en Mængde baade op- og nedstigende Grene til Svælget, hvor de danne et udbredt Karnet. Desforuden forsyner den Stenkanalen og den Poliske Blære med Kar.

Nervesystemet.

Nerveringen ligger tæt under Mundskivens Hud, indenfor Kalkringen, og omgiver Svælget, bundet til dette ved tynde Bindevævstraade. Den er temmelig bred, omtrent dobbelt saa bred, som hver af de 5 fra den udgaaende Radialnerver, og har en straagul Farve. Den dannes af et ydre cellet Lag (Skeden) og et indre, som er mere kompakt, og hvori ingen Celler var at opdage. Fra Nerveringen udgaa mange fine Grene, saavel til Svælget som til Mundskivens Hud og til Tentaklerne, samt 5 store Grene, der danne Radialnerverne. Disse ere ved deres Udspring

the extremity of the rectum. It diminishes considerably in thickness on the inferior descending portion of the intestine, fig. 3, *i*, but sends off a large number of subsidiary branches to the intestine, to which it is webbed by connective tissue.

Between the dorsal and the ventral vessels, in the walls of the intestine, extends an intermediary vascular network, whereby the said vessels are made to anastomose one with the other. Where these two vessels have their origin, the minute vessels from which they issue constitute a vascular plexus, surrounding the intestine. In this vascular network originate apparently the dorsal and ventral vessels of the stomach. We say apparently; for so it seemed to us when examining the prepared specimens on which our observations were made, though such an assumption does not agree with Semper's statement, which is based on the result of divers successful injections, undertaken to prove that no direct connexion exists between the blood-vessels of the stomach and those of the intestine.

The dorsal vessel is rather slender, but increases in thickness near the annular canal, whence a branch proceeds to the latter, several ramifications having been previously sent off to the generative organs. From the dorsal vessel proceed numbers of transversal branches, interlaced with short perpendicular branchlets, thus producing a graceful network, with large, elliptic-shaped, transversely arranged meshes.

The same applies to the ventral vessel, which also forms a wide-meshed net, anastomosing with that of the dorsal vessel, so that the stomach is completely invested with vascular network, Pl. VII, fig. 8, *i*. Whether the vessel proceeding to the annular canal open into that organ, enabling the blood to mingle with its contents, we could not determine.

From the anterior extremities of the dorsal and ventral vessels of the stomach, a vascular plexus, surrounding the œsophagus, extends under the annular canal; to this vascular network it is, that Semper has given the name of "pharyngeal curl." This annular plexus of vessels sends off large numbers of ascending and descending branches to the œsophagus, where they constitute an extensive vascular network. It furnishes, too, the sand-canal and the vesicle of Poli with vessels.

Nervous System.

The nervous ring is placed immediately beneath the muscular tunic of the oral disk, within the calcareous ring, and surrounds the œsophagus, to which it is webbed by slender filaments of connective tissue. It is rather broad, — about twice as broad as the 5 radial nerves proceeding from it, and is of a light straw-colour. It consists of an outer cellular layer (the sheath) and of an inner layer, more compact in texture, in which no cells could be detected. From the nervous ring proceed numerous slender branches, not only to the œsophagus, but also

ikke meget brede, men tiltage i Bredde, saa at de ere bredest henimod Midten af Kroppen, hvorfra de aftage i Tykkelse, indtil de mod den bagerste Ende blive yderst fine. Enhver Radialnerve løber imellem hvert Par Længdemuskler, under Radialkarret, kun adskilt fra dette og Huden ved et tyndt Lag Bindevæv, Tab. VIII, Fig. 12.

Fra Radialnerverne udgaa en Mængde Grene til Huden. Disse ere ved deres Udspring temmelig tykke, men forgrene sig meget snart og danne dels ganglionære Opsvulmninger, Fig. 13, *c*, dels fine, udbredte anastomoserende Net i Corium, Fig. 13, *b*, hvorfra udsendes Smaagrene dels til Musklerne, dels til det ydre Epithellag, hvor de forsvinde.

Radialnerverne have den samme histologiske Bygning som Nerveringen. De have en Skede, indenfor hvilken findes et lysere Cellelag, der ligesom dække det indre Lag, som synes at være stribet, Fig. 12, *a*. Uagtet al anvendt Møie har det ikke været os muligt at kunne konstatere for *Trochostomas* Vedkommende Sempers Iagttagelser med Hensyn til den finere histologiske Bygning af Radialnerverne hos Molpadiderne. Han angiver, at Radialnerven hos disse Dyr er sammensat af 3 flade Baand, tydelig adskilte ved et tyndt Bindevævsseptum og indesluttet i en Skede. Hos *Trochostoma* findes kun to Lag, og disse ere ingenlunde adskilte ved Bindevæv, men gaa umiddelbart over i hinanden.

Kjønsorganerne.

Slægten *Trochostoma* har adskilt Kjøn, og afviger saaledes fra de øvrige Molpadider, som ere antagne for at være Hermaphroditer. I Dyrets Ydre er der Intet, som angiver Kjønnet, men i den indre Bygning adskiller Hannen sig tydeligt fra Hunnen, idet nemlig Kjønsorganerne ere saa forskjellige i deres Form, at man strax kan afgjøre, hvilket Kjøn man har med at gjøre.

Kjønsorganerne ere fæstede til den fortykkede Del af det dorsale Mesenterium, lige ved Tarmens Begyndelse, og danner to store Stammer, som forene sig til en fælles Udførselsgang, Tab. IX, Fig. 39, 40. Den ene Stamme er altid noget længere end den anden.

Hos Hunnen udgaar fra den længste Stamme, der indtager omtrent Kroppens halve Længde, 28—30 dels rørformige, dels kolbeformige Udvidninger, der have en forskjellig Længde og dele sig dichotomisk, og fra den korte Stamme udgaa 15—18 lignende Forlængelser, Fig. 40, *a*.

Hos Hannen bestaar den længste Stamme af en utallig Mængde lignende Rør, som hos Hunnen, — kun ere de meget længere og tyndere, og indtage, idet de ligeledes dichotomisk dele sig, hele Dyrets Længde. Den kortere

to the integument of the oral disk, and to the tentacles; also 5 large branches, which constitute the radial nerves. The latter are not very thick at their origin, but increase in diameter, being thickest near the middle of the body, from whence they begin to diminish, till, towards the posterior extremity, they terminate remarkably slender. Each radial nerve extends between each pair of longitudinal muscles, under the radial vessel, separated from the latter and from the integument by a thin layer of connective tissue, Pl. VIII, fig. 12.

Numerous branches proceed from the radial nerves to the integument. At their origin these branches are comparatively thick, but soon divide, forming ganglionic protuberances, fig. 13, *c*, and fine-meshed, anastomosing network in the corium, fig. 13, *b*, from which subsidiary branchlets are sent off, some to the muscles, others to the outer epithelial layer, where they disappear.

The radial nerves exhibit the same histological structure as the nervous ring. They are furnished with a sheath, beneath which extends a lighter-coloured cellular layer, covering up, as it were, the inner layer, which would seem to have a striate structure, fig. 12, *a*. As regards *Trochostoma* we cannot, we regret to say, though no trouble has been spared to arrive at conclusive results, confirm Semper's observations, according to which the radial nerves in the *Molpadidæ* are distinguished by greater complexity in their histological structure. According to that zoologist, the radial nerve in these animals is composed of 3 flat bands, distinctly separated by a thin septum of connective tissue, and invaginated in a sheath. In *Trochostoma* there are but two layers, not separated by a connective membrane, but contiguous, passing one into the other.

Generative Organs.

The genus *Trochostoma* has the sexes separate, and differs therefore from all other *Molpadidæ*, which are regarded as bisexual. In the habitus of the animal there is nothing to indicate the sex; but with regard to its inner organisation, males may be readily distinguished from females by the obvious difference in form characterising the generative organs.

These organs are attached to the inspissated portion of the dorsal mesentery, in immediate proximity to the origin of the intestine, and constitute two large stems, which unite to form a common eferent duct, Pl. IX, fig. 39, 40. One of the stems is invariably longer than the other.

In the female, from 28 to 30 expansions, some tubular, some clavate, varying in length and dividing dichotomously, proceed from the longer of the stems, which extends about half the length of the body; and from the short stem proceed 15—18 similar prolations, fig. 40, *a*.

In the male, the longer stem consists of a countless number of tubes similar to those in the female; they are, however, much longer and slenderer, and extend, too, dividing dichotomously, throughout the whole length of the

Stamme har et langt mindre Antal Rør, men dog er det større, end hos Hunnens længste Stamme, Fig. 39. Den fælles Udførselsgang er meget lang (12—15^{mm}), smal, temmelig fast, og løber over Kanalen for den Poliske Blære, — følger nu langs den indvendige Rand af den venstre dorsale Længdemuskel, og er paa denne Vei bunden til Hudens Muskler med tynde muskuløse Traade. Naar den er kommen op til Mundskivens ydre Rand, udvider den sig lidt, idet den penetrerer Huden for at aabne sig paa Rygfladen, lidt nedenfor Mundskivens Rand. Udførselsgangen ligger omgivet af et eget Mesenterium, som fæster den til den dorsale Kropsvæg, imedens de to buskformige Stammer svømme frit i Kropshulheden.

Kjønsorganerne have en gul Farve, — Udførselsgangen er noget blegere. Denne dannes af et ydre flimrende Epithel, som egentlig er Peritonealovertrækket, indenfor hvilket findes et yderst tyndt Bindevæv, hvortil Muskellaget er fæstet; indenfor dette er et tykkere fibrillært Bindevævslag, til hvilket det indre, flimrende Cylinderepithel er bundet. Den samme histologiske Bygning gjentager sig i de rørformige, kolbeformige Forlængelser, kun med den Forskjel, at her er det indre Epithel ikke cilierende, men danner der særegne Celler, hvori Æggene og Zoospermerne udvikle sig.

Hvad nu Ægdannelsen betræffer, saa foregaar den paa den allerede kjendte Maade, at Kimen, eftersom den voxer, skyder Epithellaget foran sig, saa at Ægget beklædes af dette, og danner den Stilk, hvorefter Ægget ligesom hænger i Follikelen, førend det løsner fra denne, Fig. 41.

Zoospermerne udvikles ogsaa i lignende Celler i Epithelet. Cellerne fyldes ganske med Zoospermer, som ere yderst fine, korte Traade, forsynede paa Enden med en rund Knop. Foruden at Cellerne vare fyldte med Zoospermer, vare ogsaa tildels Rørene ganske fyldte dermed, og paa Spiritusexemplarene havde en stor Del tabt Halen, saa at kun en utallig Mængde af smaa runde, lidt lysbrydende Legemer vare at iagttage.

Den for Slægten *Trochostoma* saa særegne Hjulform af Dyrets Forende kunde synes velskikket til med Lethed at bortrydde de Vanskeligheder, som ofte opstaa, naar det gjælder at bestemme til hvilken Slægt en Art skal henføres; men hertil maa bemærkes, at Hjulformen først fremtræder, naar Dyret i sin fulde Vigør strækker sig ud, hvilket kun finder Sted længere Tid efterat det er fanget. Naar det kommer op i Skraben, er det altid sammentrukket, det vil sige hele Mundskiven er indtrukken og skjult af Huden. Nu kunne Dage hengaa, uden at der viser sig synderligt Tegn til, at Dyret vil strække sig ud. Men naar det saa udstrækker Mundpartiet for at hente Føde, kommer hele Hjulformen tilsyne, og da kan den holde sig saaledes i længere Tid, kun med den Forskjel, at Hjulradierne svulme mere og mindre op. Meget ofte hænder det, at kun en ringe Del af Mundskiven kommer frem, og da er der

animal. The short stem has a much smaller number of tubes, though more than the longer stem in the female, fig. 39. The common eferent duct is exceedingly long (12^{mm}—15^{mm}), narrow, and rather firm in texture; it crosses the canal of the vesicle of Poli, accompanying thence the inner margin of the left dorsal longitudinal muscle, and is webbed to the muscles of the integument by thin muscular filaments. On reaching up to the outer margin of the oral disk, it slightly expands, piercing the integument, to open on the dorsal surface, a little below the margin of the oral disk. The eferent duct is surrounded by a mesentery, that webbs it to the dorsal wall of the body, whereas the two bushy stems float freely in the perivisceral cavity.

The generative organs are of a bright yellow colour, — the eferent duct being somewhat lighter. The latter consists of an outer vibratile epithelium, — the peritoneal tunic, — under which is seen an exceedingly thin layer of connective tissue, to which the muscular layer is attached; underneath the latter extends a thicker, fibrillous layer of connective tissue, webbed to the inner vibratile cylindric epithelium. The same histological structure is observed here in the tubular, clavate prolations, with this difference, however, that the inner epithelium is not ciliated, but furnished with special cells, in which the ova and the spermatozoa develop.

As regards the formation of the ova, this proceeds in the manner already described, viz. — the germ forces before it, during the progress of growth, the epithelial layer, with which accordingly each of the ova is invested, and forms the stem, from which the egg would seem to depend into the follicle previous to being detached, fig. 41.

The spermatozoa develop in similar cells dispersed throughout the epithelium. These cells are completely filled with spermatozoa — exceedingly short, delicate filaments furnished at the extremity with a round knob. Part of the tubes, too, were full of spermatozoa, which in the spirit-specimens had lost the caudiform portion, retaining only a multitude of minute, globular, slightly refractive corpuscles.

The rotate form of the anterior portion of the body peculiar to the genus *Trochostoma,* seems a character well calculated to obviate the difficulties so often experienced when determining the genus to which a particular species should be referred; but to this we must observe, that the rotate form is not apparent save when the animal fully expands its body, which it never does till some time after capture. When brought up in the dredge, it is invariably contracted, the oral disk being drawn under and wholly concealed by the skin. Days will not infrequently pass without the animal evincing the slightest inclination to stretch itself. But when, at length, the oral portion is protruded in search of food, the rotate form becomes distinctly visible, the animal keeping in this state for some time together, the only perceptible change consisting in the aspect of the radii belonging to

ingen Anledning til at kunne iagttage Hjulformen.

Trochostoma Thomsonii lever paa Lerbund, og den fører visselig et meget stille Liv; nogen synderlig Bevægelse kan den ikke udføre; idetmindste kan den ligge ganske ubevægelig i Observationskarret i mange Dage, og man skulde tro, at der intet Liv længere var tilstede, dersom man ikke af og til saa en Excrementprop komme ud af Analaabningen, og at de oftere nævnte rørformige Forlængelser paa Mundskiven forandrede noget Form. Det er imidlertid rimeligt, at den ikke vedbliver at leve paa samme Sted hele Livet igjennem, men at den kan føres ved Strømninger fra det ene Sted til det andet; thi meget let kommer den i en rullende Bevægelse.

Farven er violet, snart lys, snart mørk, spillende noget i det Brunlige mod Bugfladen. Længdemusklerne ere skidden gule. Mundskivens rørformige Forlængelser, ligesom den forreste Del af Kroppen er i Almindelighed blegviolet. Mundskivens glatte Del og Tentaklerne ere hvidgule. Den haleformige Forlængelse bleg gul-violet. Paa et Par Exemplarer var Farven mere grønlig med større og mindre mørkebrune, næsten sorte Flækker; den haleformige Forlængelse hvid med et blegt rosenrødt Skjær, og hele Mundskiven næsten hvid, naar undtages de rørformige Forlængelser, der vare bleg grønlige.

Findested.

Station 18, Station 33, Station 137.

Slægtskarakter.

Legemet langt, cylindrisk. Den forreste Ende tvertafskaaren. Mundskiven forsynet med 15 rørformige Forlængelser, afvexlende med 15 aflange Fordybninger, hvori findes 15 papilformige Tentakler. Den bagerste Ende haleformig forlænget. Analaabningen omgivet af 5 Tænder. Huden meget ru. Ingen Fødder. To Tarmappendices (Lungetræer).

Artskarakter.

Tentaklerne rudimentære, forsynet med 3 smaa Papiller, hvoraf den midterste er den største. Kalklegemerne i Huden forskjellig formet, dels ovale, dels elliptiske, dels større gjennembrudte Plader med Kroner, og hvori Grundformen er trearmet. Hudens Farve er violet, noget brunlig mod Bugfladen og lysere i Bag- og Forenden.

the rotate part, which are seen more or less to swell. It frequently happens, however, that a small portion only of the oral disk makes its appearance, in which case the rotate form will not be observed.

Trochostoma Thomsonii affects a clay bottom, and is unquestionably a very sluggish animal; indeed its capacity of motion can be but limited; at least it will often keep motionless for days together when placed in a tub of sea-water for examination, and life would seem wholly extinct, were not a fæcal pellet seen now and again to pass out of the anal opening, accompanied by a scarcely perceptible change in the form of the tubular prolations on the oral disk. There is however no reason to suppose that this animal passes the entire period of its existence in one spot, the force of ocean currents being amply sufficient to float it from place to place, since it may be easily given a rolling, swaying motion.

Colour violet, sometimes light, sometimes dark, with a tinge of brown on the ventral surface. Longitudinal muscles a dirty yellow. The tubular prolations of the oral disk, as also the anterior portion of the body, generally pale violet. The smooth portion of the oral disk and the tentacles whitish-yellow. The caudiform portion pale yellowish-violet. In one or two specimens the colour was more of a greenish hue, relieved with dark-brown, almost black patches, varying in size. Caudiform appendix white, faintly tinged with rosy-red, and the whole of the oral disk almost white, saving the tubular prolations, which were pale greenish.

Locality.

Station 18; Station 33; Station 137.

Generic Character.

Body long, cylindric; anterior extremity truncate. Oral disk furnished with 15 tubular prolations, alternating with 15 oval-shaped depressions, in which are 15 papillary tentacula. Posterior extremity caudiform elongate. Anal opening surrounded by 5 dentelli. Skin exceedingly rugose. No suckers. Two intestinal appendices (respiratory trees)

Specific Character.

Tentacles rudimentary, furnished with 3 small papillæ, that in the middle being the largest. The calcareous corpuscles in the skin varying in form and size, some being oval and some elliptic, and some occurring as comparatively large perforated plates, each with a corolla, their fundamental form trifid, or rather three-armed. Colour of skin violet, tinged with brown on the ventral surface, and somewhat lighter at the posterior and anterior extremities.

Trochostoma (Molpadia) boreale, M. Sars.

Syn. *Molpadia violacea*, Studer?[1]

(Tab. X, Fig. 7—11).

I vor tidligere Afhandling over *Trochostoma Thomsonii* ytrede vi den Formening, at Sars's *Molpadia borealis* maatte blive at henføre til den af os opstillede Slægt *Trochostoma,* da den efter Sars's Beskrivelse ikke kunde være nogen virkelig *Molpadia.* Fra Christiania Universitets Samlinger have vi faaet udlaant Resterne af Sars's Originalexemplarer, nemlig endel Hud, noget af Tarmkanalen og Kjønsorganerne, hvorved vi ere blevne satte istand til at anstille Undersøgelser og Sammenligninger, der have bragt os til fuldkommen Vished om, at Sars's Art ikke er nogen *Molpadia,* men en *Trochostoma.* Vi have ogsaa derved faaet Anledning til dels at berigtige, dels at supplere Sars's Beskrivelse.

Med Hensyn til de ydre Karakterer skulle vi bemærke, at den haleformige Forlængelse har rundt Kloakaabningen 5 Papiller (Tænder), lig dem hos *Troch. Thomsonii,* hvilke have undgaaet hans Opmærksomhed.

Hudens histologiske Sammensætning er ikke forskjellig fra den hos *Tr. Thomsonii,* derimod ere Kalklegemerne, som ere leirede i Bindevævslaget, forskjellige, om end Grundformen er den samme. De fremtræde under to Hovedformer og i forskjellig Størrelse, nemlig de smaa, der ere dels elliptiske, dels mere eller mindre runde, — og de store, der ere mere sammensatte.

De elliptiske eller aflange, Fig. 7, *a,* 10, ligge tæt til hverandre og tildels paa hverandre, have en smuk vinrød Farve og bestaa af temmelig regelmæssige concentriske Ringe, der danne Lag, Fig. 10, imedens de mere runde Kalklegemer, Fig. 11, have en gul Farve, ere mere ujævne, bestaa ligeledes af Lag, men ikke saa regelmæssige, og ere sammenhobede imellem de elliptiske. Saavel disse som de runde danne ligesom et sammenhængende Lag, ovenpaa hvilket de store Kalklegemer hvile. Disse ere noget forskjellige, alt eftersom de findes paa de forskjellige Legemsdele, men den trearmede Grundtype gjenkjendes dog. Paa begge Ender af Legemet ligge de temmelig tæt til hverandre: Kalkpladerne ere her langstrakte med en Udløber til hver Side, og fra Midten af den af Huller gjennembrudte Plade hæver sig Skaftet, eller Kronen, der ved sin Grunddel er trearmet, men forøvrigt rundt, og udvider sig noget i den frie Ende, som er forsynet med flere Takker, Fig. 8.

[1] Dr. Th. Studer, Ueber Echinodermen aus dem antarctischen Meere. Monatsberichte der kön. preuss. Academie der Wissenschaften zu Berlin. 1877, Pag. 454.

Trochostoma (Molpadia) boreale, M. Sars.

Syn. *Molpadia violacea*, Studer?[1]

(Pl. X, figs. 7—11).

In a previous Memoir treating of *Trochostoma Thomsonii,* we expressed as our opinion that Sars's *Molpadia borealis* would have to be referred to the genus *Trochostoma,* since, according to Sars's description, it could not possibly be a true *Molpadia.* From the Zoological Collection in the University of Christiania we have obtained on loan all that was left of Sars's original specimens, viz. fragments of the skin, of the intestinal canal, and of the generative organs, which has enabled us to institute a series of comparative observations; and the results obtained afford to our minds conclusive proof that Professor Sars's species is not a *Molpadia,* but a *Trochostoma.* While conducting the examination, we have also had an opportunity of amending and supplementing Sars's description.

As regards the external characters of the animal, we must not fail to observe that the caudiform appendix is furnished round the anal opening with 5 papillæ (teeth), similar to those in *Trochostoma Thomsonii,* a feature not detected by Sars.

The histological structure of the integument is the same as in *Tr. Thomsonii;* the calcareous corpuscles, however, embedded in the layer of connective tissue, though the trifid form is fundamental in both, exhibit certain differences. Varying as they do in size, we may divide them into two groups, one comprising the small corpuscles, some of which are elliptic and some more or less globular, and the other the large corpuscles, distinguished by a more complicate structure.

The elliptic-shaped, or oblong corpuscles, fig. 7, *a,* 10, exhibit a close arrangement, lying one beside, nay frequently upon, the other are of a beautiful vinous red, and composed of comparatively concentric rings, forming layers, fig. 10; the corpuscles approximating more a circular form, fig. 11, are yellow in colour and not so smooth, but also consist of layers — less regular however — and lie crowded together between the elliptic-shaped corpuscles. Both forms, the elliptic and the round, constitute each, as it were, a continuous layer, upon which the large corpuscles are disposed. The latter vary somewhat in form according to the part of the body on which they occur: they all, however, retain the trifid, three-armed type. At the extremities of the body their arrangement is comparatively close; here, the calcareous plates are elongate, with an offshoot on either side; and from the middle of the perforate plate, pierced with numerous holes, springs the shaft, or corolla, which at its base is three-armed, but elsewhere cylindric; at its free extremity, furnished with several spikes, it slightly expands, fig. 8.

[1] Dr. Th. Studer, Ueber Echinodermen aus dem antarctischen Meere. Monatsberichte der kön. preuss. Academie der Wissenschaften zu Berlin. p. 454; 1877.

De store Kalklegemer paa den øvrige Del af Kroppen variere adskilligt i Form; væsentlig bestaa dog Afvigelserne deri, at Pladen har flere Huller, idet nemlig de oprindelige 3 Arme dele sig i flere Grene, som igjen forene sig, — og i at Skaftet (Kronen), som altid med sin trearmede Grund reiser sig fra Midten af Pladen, deler sig i to, saa at der bliver to frie Ender, der hver især er mere eller mindre takket, men altid beklædt af Epithelet. Det er disse frie Ender af Kronerne, der rage op over Hudens Niveau og give den sin ru Overflade.

Sammenlignes nu vore Afbildninger af disse Kalklegemer med Sars's, vil man finde en saa stor Forskjel, at man skulde vanskeligen tro, man havde samme Art for sig, hvilket dog er Tilfældet. Sagen er nemlig den, at Sars for det første intet Tversnit af Huden har gjort, og dernæst, at han ganske har overset Kronerne, idet han har antaget, at det er Udløberne paa Kalkpladerne, der rage op over Hudfladen.

Dersom vi ikke havde kunnet overbevise os herom ved at undersøge Huden af Sars's Originalexemplarer, vilde vi have været i temmelig stor Forlegenhed med Hensyn til Bestemmelsen af Arten, da denne, efter Sars's Angivelser, havde Kalkplader uden Kroner.

Vi have opstillet Dr. Studers *Molpadia violacea* som Synonym til *Trochostoma boreale;* thi vi finde ikke af hans korte Beskrivelse nogensomhelst Forskjel, ifølge hvilken de skulde kunne adskilles. Studers *violacea* er fundet ved Kerguelen i Mængde paa en Dybde af 100 Favne.

Trochostoma (Haplodactyla) arcticum, Marenzeller.[1]

Tab. IX, Fig. 1—5.

Af denne Holothuride blev der paa Nordhavs-Expeditionen fundet en Del Exemplarer, hvorved vi fik Anledning til at observere og afbilde den levende. Vore Undersøgelser have i det Væsentlige konstateret den af Marenzeller givne Beskrivelse, kun skulle vi tilføie følgende:

Det største Exemplar var indtil 190^{mm} langt, 30^{mm}

[1] Dr. E. Marenzeller. Die Coelenteraten, Echinodermen und Würmer der k. k. österreichisch-ungarischen Nordpol-Expedition. Denkschriften der k. k. Academie der Wissenschaften, Wien 1878, 35 Bd. Pag. 357.

The large calcareous corpuscles on the remaining portion of the body vary considerably in form; the difference they exhibit consists however merely in having the plate pierced with a greater number of holes, — the 3 original arms dividing each into several branches which afterwards unite, — and in the shaft (corolla), which, with its trifid base, invariably springs from the centre of the plate, dividing dichotomously, the result of which is two free extremities, both more or less indented, but invariably enveloped in the epithelium. It is these free extremities of the corollæ that protend above the plane of the integument, giving to the latter a rough surface.

Now, on comparing our representations of these corpuscles with those of Professor Sars, we find the difference so great, that it is difficult to conceive the possibility of their referring to one and the same species: yet such is the case. The fact is, first, that Sars did not examine a transverse section of the skin; and secondly, that he altogether mistook the character of the corollæ, believing them to be offshoots from the calcareous plates projecting above the surface of the skin.

Had we not been able to convince ourselves of this by examining the skin in Sars's original specimens, we should have found very considerable difficulty in determining the species, seeing that, according to Sars's diagnosis, the calcareous plates in this animal are without corollæ.

We have classed Dr. Studer's *Molpadia violacea* as a synonym of *Trochostoma boreale,* since his brief description does not include any distinctive feature that might be regarded as disproving the identity of the two species. Studer's *violacea* has been met with in large numbers off Kerguelen, at a depth of 100 fathoms.

Trochostoma (Haplodactyla) arcticum, Marenzeller.[1]

Pl. IX, figs. 1—5.

A few specimens of this Holothurian were collected on the North-Atlantic Expedition, which furnished us with an opportunity of figuring the animal in a living state. The results of our observations tend in all essential features to confirm the accuracy of Dr. Marenzeller's description, to which however the following supplementary particulars may be added.

The largest specimen, total length 190^{mm}, thickness in

[1] Dr. E. Marenzeller. Die Coelenteraten, Echinodermen und Würmer der k. k. österreichisch-ungarischen Nordpol-Expedition. Denkschriften der k. k. Academie der Wissenschaften, Wien 1878, B. 35, p. 357.

tykt paa Midten, havde en cylindrisk Figur med en tvers afskaaren Forende, imedens den bagerste Ende havde, som sædvanligt, en haleformig Forlængelse med 5 Tænder omkring Kloakaabningen, hvilken Forlængelse ikke afviger i Form eller Størrelse fra den, der er angivet hos *Troch. Thomsonii* og *boreale,* Fig. 1.

Paa den forreste Ende findes Mundskiven, der vender lidt mod Bugfladen, og i hvis Centrum sees den runde, lidt foldede Mundaabning. Omkring denne har Mundskiven en glat, lidt hvælvet Del, Fig. 1, *a*, 2, *a*, og i Skivens Rand ere 15 cylindriske, indtil 6^{mm} lange Tentakler, der paa den bredere Del (Bladet) er forsynet med 5—7 Papiller, hvoraf den midterste altid er den tykkeste og største, Fig. 1. 3, *a*. Paa smaa Exemplarer er der kun 3 Papiller. Naar Tentaklerne ere noget indtrukne (de kunne forresten ganske trækkes ind i sig selv), fremkommer Hjulformen, idet Tentaklerne da ligge i aflange Gruber, som adskilles ved rørformige, mørk brunfarvede Forlængelser af Kroppens forreste Rand, hvilke Forlængelser gaa hen til den glatte hvælvede Del af Mundskiven, Fig. 2 (se vor Beskrivelse af *Trochostoma Thomsonii).*

Tversnit af Huden viser ingen Forandring i anatomisk-histologisk Henseende fra de to foregaaende Arter, hvorimod Afvigelser finde Sted med Hensyn til Kalklegemerne, Tab. X, Fig. 6. Der findes nemlig kun en Hovedform, gjennembrudte Kalkplader med Kroner. Disse Kalkplader variere noget efter det Sted af Kroppen, paa hvilket de ere leirede, men alle have de den trearmede Grundtype. Meget hyppigt er Skaftet (Kronen) delt lige fra Roden, og da ser det ud, som om der var to Kroner paa hver Plade, Tab. IX, Fig. 5.

I levende Live er Farven graagrøn, spillende i det violette. Tentaklerne ere temmelig klare med et let violet Anstrøg, der især er tydeligt paa Papillerne. Den forreste Halvdel af Kroppen bevæger sig op og ned og strækker sig ofte ud med sine Tentakler for at søge Føde, ligesom Haledelen bevægede sig i alle Retninger. Den bredere Del af Kroppen forholdt sig temmelig rolig. Analaabningen udvidede sig kun sjelden. Den haleformige Forlængelse kunde indtrækkes temmelig betydeligt, og blev derved forkortet, uden dog at forsvinde. At ogsaa denne Art maa henføres til vor opstillede Slægt *Trochostoma,* kan vel ikke drages i Tvivl.

Findested.

Station 260. Porsangerfjord. Stat. 261. Stat. 323.

the middle 30^{mm}, was cylindric in form, with the anterior extremity truncate; the posterior extremity, as is commonly the case in this genus, had a caudiform appendage, furnished with 5 teeth, or dentelli, round the anal opening, the said appendage differing in no wise as regards form or size from that in *Troch. Thomsonii* and *Troch. boreale,* fig. 1.

On the anterior extremity is seen the oral disk, slightly inclining towards the ventral surface, and in its centre the circular and slightly folded buccal aperture. Round the latter, the oral disk exhibits a smooth and slightly arcuate surface, figs. 1, *a;* 2, *a;* and, extending along the margin of the disk, are seen 15 cylindric tentacles, the longest measuring 6^{mm}, which on the broader part (the pinna, or leaf) have from 5 to 7 papillæ, that in the middle being invariably thickest and largest, figs. 1; 3, *a*. In small examples there are only 3 papillæ. On the animal drawing in its tentacles a little (these organs are wholly retractile), the rotate form makes its appearance, the tentacles then occupying oblong cavities, which are separated one from the other by tubular continuations — dark-brown in colour — of the anterior margin of the body, the said continuations proceeding to the smooth, arcuate portion of the oral disk, fig. 2 (see our description of *Trochostoma Thomsonii).*

A transverse section of the skin exhibits no histological deviation from the two preceding species; but as regards the calcareous corpuscles, various distinctive features are apparent, Pl. X, fig. 6. For instance, they are all comprised in one fundamental form, viz. perforate calcareous plates with corollæ. These calcareous plates vary somewhat, according to the part of the body where they lie embedded; but the trifid, three-armed type is common to all. Very frequently the shaft (corolla) is cleft to the base, and in that case two corollæ appear to spring from each plate, Pl. IX, fig. 5.

When alive, the animal is of a grey-green colour, bordering on violet. The tentacles are comparatively bright, with a tinge of violet, on the papillæ in particular plainly perceptible. The anterior half of the body moves up and down, and is frequently stretched out, with the tentacles exserted, in search of food; the caudiform appendage kept moving, too, in all directions; the broader portion of the body remained comparatively quiescent. The anal opening was but seldom expanded. The caudiform appendage admits of being considerably retracted; but though often very much shortened, it was never seen wholly to disappear. The propriety of referring also this species to our new genus *Trochostoma,* will not, we opine, be called in question.

Locality.

Station 260; the Porsangerfjord; Stations 261 and 323.

Ankyroderma[1] Jeffreysii, n. g., n. sp.

Tab. X, Fig. 12—15. Tab XI, XII.

Legemet cylindrisk, successivt afsmalnende mod begge Ender med en yderst ru Overflade, der ved de 5 Par Længdemuskler er afdelt i 5 Felter.

Den forreste Ende er tvers afskaaren, og i Midten af Mundskiven, Fig. 13, sees den runde Mundaabning, der er stærk foldet paa langs, naar den er sammentrukket. Den indre Del af Mundskiven er glat og lidt hvælvet, Fig. 13, *a*, den ydre Del dannes af 15 rørformige Forlængelser, der ere bredere udad, smalere indad, Fig. 13, *b*, og imellem hvilke sees 15, omtrent 0.5^{mm} lange, 3delte Tentakler, Fig. 13, *c*. 25. Strax bagenfor den forreste Kropsrand, paa Rygsiden og omtrent midt imellem de to Længdemuskler, findes en stor, enten graalighvid, eller gulagtig fremragende Papille, i hvis Midte sees en rund Aabning for Kjønsorganets Udførselskanal, Fig. 12, Fig. 13, *d*.

Kroppens bagerste Ende har en temmelig lang haleformig Forlængelse, paa hvis Spids findes den runde Kloakaabning, omgivet af 5 Papiller (Tænder), Fig. 12, 14.

Legemets Størrelse varierer noget, i Almindelighed er det 40^{mm} langt, 18^{mm} bredt paa Midten; men vi have to Exemplarer, der have en Længde af indtil 75^{mm}, og en Bredde af 28^{mm}.

Huden er paa yngre Exemplarer tynd, og, naar den er udspændt, halv gjennemsigtig, uden dog at Indvoldene tydelig kunne sees; paa ældre Dyr er den fast, næsten læderagtig og aldeles uigjennemsigtig, saa at neppe Længdemusklerne kunne skimtes. Dens ydre Flade, seet under Loupen, er overalt forsynet med smaa runde Papiller, i hvis Midte er en Aabning, hvorigjennem en Kalkstav stikker frem, og imellem disse Papiller iagttages hist og her smaa stjerneformige Legemer, der dannes af et lidt ophøiet Centrum, fra hvilket udgaar straaleformigt 5—6 Kalknaale.

Huden har som sædvanligt en glasklar, strukturløs Cuticula, Fig. 24, *a*, et cellerigt Epithel, Fig. 24, *b*, og den egentlige Corium, bestaaende af fibrillært Bindevæv, Fig. 24, *c*, indenfor hvilket Muskellaget med den flimrende Peritonealbeklædning findes, Fig. 24, *d*.

Muskellaget bestaar af Tver- og Længdemuskler. Tvermusklerne, Fig. 15, *a*, danne en sammenhængende Hud, der er afbrudt ved Længdemusklerne. Disse ere 5 Par, der ere 4—5^{mm} brede, med et Mellemrum af 1^{mm}'s Bredde, Fig. 15, *b*.

Bindevævslaget (Corium) er meget rigt paa forskjellige Slags Kalklegemer, der optræde under tre Hovedformer. De smaa, runde eller elliptiske ere i størst Mængde tilstede, og sædvanligvis leirede i Grupper, Fig. 24, *e*, —

[1] ἄγκυρα = Anker, og δέρμα = Hud.

Ankyroderma[1] Jeffreysii, n. g., n. sp.

Pl. X, figs. 12—15; Pl. XI, XII.

Body cylindric, tapering gradually towards both extremities, with an exceedingly rough surface, divided by the 5 pairs of longitudinal muscles into as many sections.

Anterior extremity truncate. In the middle of the oral disk, fig. 13, is seen the round oral aperture, which, when contracted, exhibits deep longitudinal folds. The inner portion of the oral disk is smooth and slightly arcuate, fig. 13, *a*; the outer portion consists of 15 tubular prolongations, broader externally, narrower internally, fig. 13, *b*, and between which are seen 15 trifid tentacula, about 0.5^{mm} long, figs. 13, *c*; 25. Immediately posterior to the anterior margin of the body, on the dorsal surface and about midway between the two longitudinal muscles, occurs a large projecting papilla, partly greyish-white, partly yellowish, in the centre of which is seen a round opening, for the eferent duct of the generative organ, figs. 12; 13, *d*.

The posterior extremity of the body has a comparatively long, caudiform appendage, on the tip of which is seen the circular cloacal opening, surrounded by 5 papillæ (teeth, dentelli), figs. 12; 14.

The body varies in size, being however in most individuals 40^{mm} long and 18^{mm} broad in the middle; but we have in our possession two specimens with a length of 75^{mm} and a breadth of 28^{mm}.

The skin in young examples is thin and, when much stretched, semi-transparent; the viscera cannot however be distinctly seen. In mature individuals, it is firm, almost coriaceous in texture, and quite opaque, the longitudinal muscles even being with difficulty discerned. Its outer surface, when viewed under a lens, appears everywhere furnished with small round papillæ, having in the centre an aperture, through which protends a calcareous rod; and between these papillæ are seen every here and there minute stellate corpuscles, consisting of a slightly elevated centre, from which radiate 5 or 6 calcareous spicules.

As is commonly the case, the skin consists of a crystalline structureless cuticle, fig. 24, *a*, a cellular epithelium, fig. 24, *b*, and the corium, composed of fibrillous connective tissue, fig. 24, *c*, under which extends the muscular layer with its vibratile peritoneal tunic, fig. 24, *d*.

The muscular layer is composed of transverse and longitudinal muscles. The transverse muscles, fig. 15, *a*, constitute a continuous integument, intersected by the longitudinal muscles. The latter, of which there are 5 pairs, have a breadth of 4^{mm}—5^{mm}, that of the space between each pair being 1^{mm}, fig. 15, *b*.

Throughout the layer of connective tissue (corium) occur in great abundance various kinds of calcareous corpuscles, comprised under three typical forms. The first is either round or elliptic, and the corpuscles belonging to this

[1] ἄγκυρα, anchor; δέρμα, skin.

kun hos ældre Individer ligge de tættere sammen og danne næsten et sammenhængende Lag, hvorved de nærme sig meget baade i Form og Anordning de, der findes hos *Troch. boreale,* Fig. 19. Saavel de runde Kalklegemer som de elliptiske bestaa af koncentriske Ringe og have en skjøn, mørkvinrød Farve, kun enkeltvis ere de gule, Fig. 24[1]. De ovale have i Midten ligesom en Kjerne, der altid viser sig med en intensere Farve.

Den anden Form af Kalklegemerne ere farvefrie, gjennembrudte Plader, fra hvis Midte reiser sig en trearmet Krone, der har en knopformig fri Ende, forsynet med 3 eller 4 runde Takker, Fig. 24, *f*. Det er denne Ende og endel af Skaftet, som rager op igjennem de omtalte Papillers Aabning. Saavel Pladen som Skaftet er beklædt af et tyndt Lag af Bindevæv, der danner ligesom en Skede om Skaftet, hvilken er dækket af Epithelet og Cuticula, Fig. 24, *g*. Disse Kalklegemer findes i stor Mængde overalt paa Kroppen, men ere dog saavidt spredte, at de ikke ligge tæt i hverandre, uden paa begge Kropsenderne, Fig. 20. Her have de en mere langstrakt Form, Fig. 19, og ligge saa tæt til hverandre, at de f. Ex. paa den forlængede Haledel danne saagodtsom et Pantser. Ogsaa disse Legemer have særdeles meget tilfælles med de Kalkplader, der findes hos *Troch. Thomsonii* og *boreale.*

Den tredie Form af Kalklegemer er ganske eiendommelig og minder om Tilværelsen af en *Synapta,* der forlængst er forsvunden. Det er disse Legemer, der danne den tidligere omtalte Stjerne, og som udgjør et Komplex af 5—6 spatelformige Kalkstave, Fig. 24, *h,* og et Kalkanker, Fig. 21. Dette stjerneformige Legeme er indesluttet af en Hulhed, der dannes af Bindevævet, og hvis ydre Flade er beklædt af Epithelet, Fig. 24, *i, i*. Saavel Bindevævet som Epithelet forlænger sig et Stykke op paa Ankerstokken, men Kløerne ere nøgne.

Enhver spateldannet Kalkstav bestaar af et meget langt og rundt Skaft, der som oftest er afrundet paa den fri Ende, Fig. 21, *a,* og en bredere Del, eller Blad, der er næsten rundt, temmelig tykt og forsynet med en stor Mængde Huller, Fig. 21, *b*. Det er disse bredere Dele med deres afrundede Rande, der støde til hverandre og danne Stjernens Centrum, imedens Skafterne danne Straalerne, Fig. 20, 21. Til Midten af Stjernens Centrum er fæstet ved Bindevæv et bevægeligt Kalkanker, Fig. 20, 21. Ankerstokken er rund, meget lang, og den Del, der er fæstet til Spatelbladene, har 5—6 listeformige Fremstaaenheder, alt eftersom Stjernen dannes af 5 eller 6 Stave, Fig. 21, *c*. Ankerets Kløer ere lange og tilspidsede, og paa deres ydre konvexe Rand ere tre Takker, Fig. 21, *d*. Ankeret kan bevæge sig til alle Sider ved sin ligamentøse Sammenheftning.

type, which are the most numerous, generally occur embedded in groups, fig. 24, *e;* in mature individuals only do they exhibit a closer arrangement, constituting an almost continuous layer, and hence approximating in form and disposition those in *Troch. boreale,* fig. 19. Both the round and the elliptic corpuscles consist of concentric rings, and are of a vivid vinous red, a few only being yellow, fig. 24[1]. The oval corpuscles have in the centre a kind of nucleus, invariably of a deeper colour.

The corpuscles exhibiting the second form are colourless perforate plates, from the centre of which springs a three-armed corolla, having at its free extremity a knob, furnished with 3 or 4 cylindric spines, fig. 24, *f*. It is this extremity, together with part of the shaft, that protends through the opening in the papillæ mentioned above. Both the plate and the shaft are invested with a thin layer of connective tissue, the shaft being, as it were, invaginated in a sheath, covered by the epithelium and the cuticle, fig. 24, *g*. These calcareous corpuscles occur everywhere in large numbers on the body, but their arrangement, saving at the extremities, is not so close as to bring them in direct contact one with the other, fig. 20. Here (at both extremities) they are more elongate in form, and so closely disposed, that in places, on the caudiform appendage for instance, they constitute a kind of armature. These corpuscles, too, have much in common with the calcareous plates in *Troch. Thomsonii* and *Troch. boreale.*

The third typical form in which these calcareous corpuscles occur is eminently characteristic, indicating, it would seem, a *Synapta* stage of development, out of which the animal has long since passed. It is these corpuscles that form the stellate figure mentioned above; they constitute, too, a complex of spatulate calcareous rods, 5 or 6 in number, fig. 24, *h,* as also a calcareous anchor, fig. 21. This stellate figure occurs in a depression, or cavity, in the connective tissue, and has its outer surface clothed with the epithelium, fig. 24, *i, i*. The connective tissue and the epithelium are both prolonged some distance up on the stock of the anchor; but the arms are naked.

The spatulate rods consist each of an exceedingly long, cylindric shaft, rounded, as a rule, at the free extremity, fig. 21, *a,* and of a broader pinnate portion, almost round, rather thick, and furnished with numerous apertures, fig. 21, *b*. It is these broader parts with their rounded margins that approximate to form the centre of the stellate figure, the shafts representing the radii, figs. 20; 21. Webbed to the centre of the stellate figure, is seen a moveable calcareous anchor, figs. 20; 21. The stock of the anchor is cylindric, exceedingly long, and the part webbed to the spatulate lobes is furnished with linear apophyses, 5 or 6 in number, according as the stellate figure consists of 5 or of 6 calcareous rods, fig. 21, *c*. The arms of the anchor are long and pointed, and their outer convex margin has 3 spines, fig. 21, *d*. The anchor is moveable in all directions, by means of its ligamentous connexion with the stellate figure.

Hverken i Mundskiven eller Tentaklernes Hud findes Kalk.

Fordøielsesorganerne.

Tarmen danner de sædvanlige to Bøininger og gaar da med en temmelig lige Rectum over i Kloaken, Fig. 15, *c*. Denne er langstrakt oval, og fra dens forreste Del udgaar paa hver Side af Rectum et Tarmappendix (Respirationsrør), Fig. 15, *d*, 23. Det venstre, Fig. 15, *e*, 23, har en temmelig kort, næsten nøgen Stamme, fra hvis forreste Ende udgaar en kort Gren, der deler sig i utallige større og mindre Blærer, som antage Formen af en Drueklase. Det høire Appendix, Fig. 15, *f*, 23, er meget langt, fæster sig paa 3 af Kalkringens Radialprocesser og er paa hele Længden forsynet med større og mindre Blærer, der dels sidde enkeltvis, dels i mindre Grupper med lange Mellemrum.

Forøvrigt er Tarmen i histologisk-anatomisk Henseende ganske overensstemmende med den, der af os er beskreven hos *Troch. Thomsonii*.

Det indre Skelet.

Kalkringen, Fig. 27, bestaar af 10 Stykker, 5 Radialstykker og 5 Interradialstykker, hvilke hos unge Dyr ere bundne sammen med Bindevæv, saa de kunne skilles fra hverandre, imedens de hos ældre Dyr ere fuldstændig sammenvoxede; Sømmene ere ganske forkalkede, saa de enkelte Stykker ikke kunne skilles fra hverandre, hverken med Kniven eller kaustisk Kali.

Radialstykkerne, Fig. 27, *a*, ere 4^{mm} lange og 2^{mm} brede; paa Legemets udvendige Flade to fremragende Kamme, Fig. 27, *b*, *b*, der paa den bagerste Trediedel udvider sig i Bredden, saa at her fremkommer en Knude, bagenfor hvilken Kammen bliver smalere. Den ene af Kammene har paa den forreste Del en Fordybning, der tjener til Fæstepunkt for Radialmuskelen, Fig. 27, *c*; imellem begge Kammene er en temmelig dyb Fure, Fig. 27, *d*, der optager en Ampulle. Fortil ende disse Kamme i to Fremstaaenheder, hvoraf den ene er lidt kortere, bredere og mere afrundet, end den anden, og imellem hvilke findes et halvrundt Indsnit, Fig. 27, *e*.

Ethvert Radialstykke har en bagerste, forlænget Del (Processus), som paa sin yderste Ende er spaltet, Fig. 27, *f*, og til hvis indre Flade Radialkarret er fæstet. De 4 af disse Processer ere omtrent lige lange, indtil 2^{mm}; men den 5te, den nemlig, som svarer til Bugens midterste Radialkar, er meget kortere, omtr. 1^{mm}. Alle disse Processer vende med deres spaltede Spidser saa stærkt indad

Neither the oral disk nor the tentacles exhibit any trace of calcareous deposit.

Digestive Organs.

The intestine has 2 convolutions, and passes, with a comparatively straight rectum, into the cloacum, fig. 15, *c*. The latter organ is elongato-ovate in form; and from its anterior part protends on either side of the rectum an intestinal appendage (respiratory tube), figs. 15, *d*; 23. The left appendage, figs. 15, *e*; 23, has a comparatively short and almost naked stem, from the anterior extremity of which proceeds a short branch, dividing into countless vesicles, varying in size, which present the appearance of a cluster of grapes. The right appendix, figs. 15, *f*; 23, is exceedingly long; it is webbed to three of the radial processes of the calcareous ring, and furnished throughout its entire length with vesicles, varying in size, some of which are isolated and some arranged in small groups with considerable interspace.

For the rest, the histological structure of the intestine differs in no wise from that distinguishing the organ in *Troch. Thomsonii*.

Calcareous Skeleton.

The calcareous ring, fig. 27, consists of 10 segments, 5 radial and 5 interradial, which, in immature examples, are webbed together by connective tissue, and thus admit of being parted, whereas in full-grown individuals they are connate; the sutures are wholly calcined, and some of the segments cannot be separated, either with a knife or when treated with a solution of caustic potash.

The radial segments, fig. 27, *a*, are 4^{mm} long and 2^{mm} broad; on the outer surface of the body are seen two projecting combs, fig. 27, *b*, *b*, which expand at their posterior third, and here accordingly there is a protuberance, posterior to which the comb becomes narrower. One of the combs has on its anterior part a depression, which serves as a point of attachment for the radial muscle, fig. 27, *c*; and between the two combs there is a rather deep groove, fig. 27, *d*, for the reception of an ampulla. Anteriorly, these combs terminate in two protuberances, one of which is somewhat shorter, broader, and more rounded than the other, and between which is seen a semicircular incision, fig. 27, *e*.

Each radial segment has a posterior elongate part, or process, cleft at the extremity, fig. 27, *f*, and to the inner surface of which the radial vessel is webbed. Four of these processes are about equal in length (2^{mm}); but the fifth — that corresponding to the medial radial vessel of the belly — is much shorter, about 1^{mm}. All of the processes incline with their cleft extremities so

mod Spiserøret, at dette netop faar Plads til at passere dem. Paa Radialstykkets indvendige Flade er en smal, dyb Fure for Radialkarret.

Interradialstykkerne have paa den ydre Flade en fremragende Kam, Fig. 27, *g*, der har en lignende Knude som den, der er omtalt ved Radialstykkerne; fortil ender denne Kam i en temmelig lang Spids; imellem denne og Radialspidsen er et halvmaaneformigt Indsnit, Fig. 27, *h*. Paa hver Side af Kammen er en dyb Fure, Fig. 27, *i*, der afsluttes ved de tilstødende Radialstykker, og som tjener til at optage en Ampulle. Hvert Interradialstykke har saaledes 2 Ampuller og hvert Radialstykke 1.

Ampullerne, Fig. 26, *b, b*, ere yderligere befæstede ved et Ligament, som gaar fra den ene Kamknude til den anden. Kalkringens forreste Rand har 15 Spidser og ligesaa mange Indsnit. Interradialspidserne ere meget længere, end de øvrige.

Man vil af denne Beskrivelse, sammenholdt med den, der af os er given over Kalkringen hos *Tr. Thomsonii*, finde, at *Jeffreysii* Kalkring adskiller sig fra denne væsentlig ved sine stærkt fremspringende Kamme, ved Knuderne paa samme og ved de dybe Ampullefurer.

Vandkarringen slutter sig tæt til Spiserøret og udsender sine 5 Hovedstammer, der dele sig ligesom hos *Tr. Thomsonii*. Den Poliske Blære er temmelig stor, ægformig og forsynet med en lang Stilk, Fig. 15, *g*, 26, *c*.

Stenkanalen er ved sin ydre Ende fæstet til den indre Kropsvæg, løber langs Kjønsorganernes Udførselskanal, og omtrent 0.5^{mm} fra Befæstningspunktet har den en Madreporplade, Fig. 15, *i*, 16, der hos yngre Dyr dannes af en enkelt Omslyngning af Kanalen, i hvis Midte er en Indsynkning, Fig. 18; hos ældre er den mæneandrisk, Fig. 16, 17. Stenkanalen er omgivet af Kalkfletninger fra dens Fæstepunkt i Huden til noget over Midten, den inderste Trediedel er fri for Kalk. Paa et Exemplar, det største, vi have havt til Undersøgelse, var Stenkanalen delt i to Grene, der hver med sin afrundede Ende fæstede sig i Corium, Fig. 16, 26, *g*. Strax indenfor Delingen sad Madreporpladen med sin mæneandriske Overflade. Saavel Stenkanalen som Madreporpladen var bygget paa samme Maade som hos *Tr. Thomsonii*, hvortil vi henvise.

Blodkarsystemet, ligesom Nervesystemet, afviger ikke fra disse Systemer hos Slægten *Trochostoma*.

Kjønsorganet er fæstet til det dorsale Mesenterium og bestaar af to korte Stammer, der forene sig til en fælles Udførselsgang, som er meget lang, og som udmunder i den tidligere omtalte Papille paa den forreste Del af Dyrets Ryg. Den ene Stamme er lidt længere end den anden; men fra begge udgaa yderst faa aflange blæreformige Udvidninger, der hos de Individer, vi undersøgte, vare udfyldte af mere eller mindre udviklede Æg, Fig. 15, *h*.

rapidly inward towards the œsophagus as barely to leave space for its passage. On the inner surface of each radial segment is seen a narrow and deep groove for the reception of the radial vessel.

The interradial segments have on their outer surface a projecting comb, fig. 27, *g*, exhibiting a protuberance similar to that on the radial segments; anteriorly, this comb terminates in a comparatively elongate point, and between the latter and the radial point is seen a lunate incision, fig. 27, *h*. On either side of the comb extends a deep groove, fig. 27, *i*, bounded by the contiguous radial segments, and which serves for the reception of an ampulla. Hence, each interradial segment has 2 ampullæ, and each radial segment 1.

The ampullæ are further attached by a ligamentous filament, extending from one pectinate protuberance to the other. The anterior margin of the calcareous ring has 15 points and as many incisions. The interradial points are much longer than the others.

On comparing this description with that we have given of the calcareous ring in *Troch. Thomsonii*, the chief distinctive features of that organ in *Ankyr. Jeffreysii* are found to be the projecting combs, the pectinate protuberances, and the deep grooves for the reception of the ampullæ.

The water-vascular ring adjoins the œsophagus, and from it spring 5 columnar stems, which divide, as in *Troch. Thomsonii*. The vesicle of Poli is rather large, ovate, and furnished with a long pedicle, figs. 15, *g*; 26, *c*.

The sand-canal is webbed at its outer extremity to the inner wall of the body, and accompanies the eferent duct of the generative organ; about 0.5^{mm} from the point of attachment it has a madreporic body, figs. 15, *i*; 16, formed in immature examples by a single circumvolution of the canal, with a depression in the middle, fig. 18; in mature individuals it is sinuous, figs. 16; 17. The sand-canal is surrounded by calcareous reticulations from the point of attachment in the skin to a little beyond the middle; the inner third has no calcareous deposit. In one of our examples — the largest — the sand-canal was divided into two branches, each with its rounded extremity attached to the corium, figs. 16; 26, *g*. Immediately within the line of division occurred the madreporic body, with its meandrian surface. The structure both of the sand-canal and the madreporic body was precisely the same as in *Troch. Thomsonii*.

The circulatory system and the nervous system differ in no wise from those systems in the genus *Trochostoma*.

The generative organ is webbed to the dorsal mesentery; it consists of two short stems, which unite to form a common eferent duct, exceedingly long, and opening into the papilla, previously described, on the anterior part of the back. One of the stems is somewhat longer than the other; and from both proceed a very few oblong vesicular expansions, which in the specimens examined were full of ova, more or less mature, fig. 15, *h*.

Farven.

Kroppen varierer fra det Graagrønne til det mørkt Violette. Den forreste Ende med Mundskiven og Tentakler er gulhvid. Halen er hvid. Papillen for Udførselskanalen for Kjønsorganet er stærkt gul paa den violette Krop, men næsten hvid, hvor Legemets Farve er graagrøn.

Findested.

Station 260. Stat. 261. Stat. 262. Stat. 362.

Colour.

That of the body varies, being either grey-green or dark-violet. The anterior extremity, together with the oral disk and the tentacles, yellowish-white. Caudiform appendix white. The papilla of the eferent duct of the generative organ vivid yellow with the body violet, but almost white when it is grey-green.

Locality.

Stations 260, 261, 262, and 362.

Ankyroderma affine, n. sp.

(Tab. XII. Fig. 28—36).

Legemet er rut, cylindrisk, smalere mod den forreste Ende, der er tvers afskaaren, og forsynet med en haleformig Forlængelse i den bagerste Del. Af de tre Exemplarer, vi fandt, er det største 55^{mm} langt.

5 Par Længdemuskler, hvoraf hver Muskel er 2.5^{mm} bred paa Midten af Kroppen, imedens de blive betydelig smalere mod begge Ender. Mellemrummet, hvori Kar og Nerve ligger, er paa Midten omtrent 0.5^{mm} bredt, men ogsaa dette bliver smalere, jo mere det nærmer sig Legemets Ender, Fig. 30, *a*.

Mundskiven er i Midten forsynet med 15 yderst korte, tredelte Tentakler; forresten findes ogsaa hos denne Art den for *Trochostoma* særegne Hjulform. Omtrent 2—3^{mm} fra Kroppens forreste Rand, paa Rygsiden, sees en lille rund, hvid, lidt eleveret Papille, i hvis Midte findes den runde Aabning for Kjønsorganernes Udførselskanal. Paa Spidsen af den haleformige Forlængelse sees den runde Kloakaabning, der er omgivet af 5 smaa Kalkpapiller (Tænder).

Seet under Loupen er Kroppens Overflade forsynet med tætstaaende Papiller, i hvis Midte er en Aabning, hvorigjennem Kronerne paa de gjennembrudte Kalknaale stikke; desforuden sees, fornemmelig paa Ryggen, flere Længderækker af glindsende, stjerneformige Legemer, hvorfra Ankere rage op over Hudens Overflade, Fig. 29, *a*. Disse Rækker strække sig fra Grunden af Haleforlængelsen til henimod Kroppens forreste Rand, Fig. 29.

Huden er temmelig tynd, fast, halv gjennemsigtig, saa at naar Kropshulheden er udfyldt, sees Længdemusklerne meget tydeligt, Indvoldene derimod mindre. Den bestaar

Ankyroderma affine, n. sp.

(Pl. XII, figs. 28—36).

Body rough, cylindric, narrowest at the anterior extremity, which is truncate; posterior extremity furnished with an elongate caudiform appendage. The largest of our three specimens measured 55^{mm} in length.

Five pairs of longitudinal muscles; breadth of each muscle 2.5^{mm} in the middle of the body, at the extremities considerably less. The space occupied by the vessel and the nerve about 0.5^{mm} broad; but this, too, becomes much narrower as it approaches the extremities of the body, fig. 30, *a*.

The oral disk is furnished in the middle with 15 exceedingly short trifid tentacles; for the rest, the rotate form distinguishing *Trochostoma* is also characteristic of this species. About 2^{mm} or 3^{mm} from the anterior margin of the body, on the dorsal surface, is seen a small, round, white, slightly prominent papilla, having in the centre a circular aperture for the eferent duct of the generative organ. On the tip of the caudiform appendage is seen the round cloacal opening, surrounded by 5 small calcareous papillæ (dentelli).

When viewed under a lens, the surface of the body is found to be furnished with closely set papillæ, each with an opening in the middle, through which protend the corollæ of the perforate calcareous spicules; moreover, several longitudinal series of lustrous stellate corpuscles are also observed, from which anchor-like bodies project above the surface of the integument, fig. 29, *a*. These series extend from the base of the caudiform appendage nearly to the anterior margin of the body, fig. 29.

The skin is comparatively thin, firm in texture, and semi-translucent, so that when the perivisceral cavity is distended with fluid the longitudinal muscles are distinctly

af de sædvanlige Lag og adskiller sig ikke i saa Henseende fra den foregaaende Arts Hud.

I Corium ere forskjelligformede Kalklegemer leirede. I det ydre Lag findes de under *Jeffreysii* beskrevne stjernedannede Grupper, der bestaa i Regelen af 5 spatelformede Kalkstave, fra hvis Midte Ankeret rager frem, Fig. 34. Kun ere disse Grupper i langt større Mængde tilstede, og ere stillede i næsten regelmæssige Rækker hos denne Art. Kalkspatlernes Skaft er noget kortere. Bladet noget mindre, men mere afrundet og forsynet med flere Huller, Fig. 34, *a*. Ankerstokken er noget kortere og tykkere, og paa Kløernes ydre Rand er der 4 Takker, Fig. 34, *b*. Disse stjerneformige Kalklegemer ere indesluttede i særegne Papiller, der dannes af Bindevævet og ere beklædte med Epithelet og Cuticula; kun Ankeret rager med sin yderste Ende udenfor Papillen.

Ved Siden af disse Legemer, dels i Niveau med dem, dels noget dybere i Bindevævet, sees, foruden de almindelige gjennembrudte Kalkplader med Krone, hvilke dog hos denne Art er i saa høi Grad uregelmæssige med Hensyn til Formen, at det er vanskeligt at finde 2—3, der fuldkommen ligne hverandre, endnu andre Kalklegemer, der ere ganske særegne. De bestaa af et Midtparti, hvorfra udgaa som oftest 3, stundom 4 Stammer; disse dele sig atter i 2 Grene, som løbe snart lige ud, snart krumme de sig noget, og kun sjeldent forene de sig, Fig. 31, 32, 33. Fra Centrum hæver sig en Slags Krone, der hyppig ender som en spids Naal, men som ogsaa ofte har en bredere Ende, forsynet med 3 afrundede Knuder, Fig. 31, *a*[1]. Begge disse Slags Kroner, der gaa igjennem Papillernes Aabning, ere beklædte med en Bindevævsskede, som naar op imod Enden, og udenpaa hvilken er Epithel- og Cuticulalaget. Imellem disse Kalklegemer ligge paa enkelte Steder af Ryggen et og andet yderst lidet, næsten rundt Kalkkorn, der har en mørk-vinrød Farve; men under det, eller rettere indenfor, altsaa i et dybere Lag af Corium, iagttages en stor Mængde farvefrie Kalklegemer, der ere mere eller mindre afrundede og bestaa af et Conglomerat af Kalkkorn eller Kalkprismer, Fig. 35, 36. I Bindevævet findes desforuden temmelig meget grønligt Pigment, der ligger i uregelmæssige Klumper.

Fordøielsesorganerne frembyde intet Særegent. Kun det venstre Tarmappendix er noget længere, end paa *Jeffreysii*, og er næsten lige fra dets Udspring besat med Smaablærer, Fig. 30, *b*.

Det indre Skelet, Kalkringen, er ligesom hos *Jeffreysii* fuldstændig forkalket, saa at det ikke er muligt at skille de enkelte Stykker fra hverandre; imidlertid kunne Sømmene temmelig tydeligt iagttages under Loupen. Det er muligt, at Kammene, saavel paa Radial- som Interradialstykkerne, ere mere fremspringende, og Spidserne paa den

perceptible, — the viscera however less so. The integument is composed of the usual layers, and in this respect does not differ from the skin in the foregoing species.

In the corium are embedded calcareous corpuscles, varying in form. In the outer layer occur the stellate groups observed in *Jeffreysii*, consisting as a rule of 5 spatulate calcareous rods, from the middle of which protends the anchor, fig. 34. These groups are, however, far more numerous in the present species, and are arranged in almost regular series. The shaft of the calcareous spatulæ is somewhat shorter, the lobule somewhat smaller, but more rounded and furnished with a greater number of apertures, fig. 33, *a*. The stock of the anchor is a trifle shorter and thicker, and on the outer margin of the arms are seen 4 spines, fig. 34, *b*. These stellate calcareous corpuscles lie enclosed in special papillæ, consisting of connective tissue, and are covered by the epithelium and the cuticle; the anchor only projects with its outer extremity above the papilla.

Approximating these corpuscles, either in the same plane or embedded somewhat deeper in the connective tissue, are seen, exclusive of the more numerous perforate calcareous plates with corollæ, — which however in this species vary so much with regard to form that it is difficult to find two or three exactly alike, — other calcareous corpuscles, essentially distinct. They consist of a central portion, from which proceed generally 3, sometimes 4 stems, that divide dichotomously, the 2 branches, sometimes straight, sometimes slightly bent, seldom uniting, figs. 31; 32; 33. From the centre springs a kind of corolla, which frequently terminates in a sharp spicule, but which, too, has often a broader extremity, furnished with 3 rounded protuberances, fig. 31, *a*. Both kinds of corollæ, which pass through the opening of the papillæ, have a sheath of connective tissue, that reaches up towards the extremity, and is covered by the epithelial and cuticular layers. Between these calcareous corpuscles occur on certain parts of the back one or two extremely small, almost round calcareous granules, of a dark vinous red; but underneath the granules, or rather lower down, in a deeper layer of the corium, are seen large numbers of colourless calcareous corpuscles, more or less rounded, and consisting of an agglomeration of calcareous granules, or calcareous prisms, figs. 35; 36. In the connective tissue also occurs a considerable quantity of a greenish pigmentary substance, distributed in irregular lumps.

The digestive organs exhibit no peculiar feature. The left intestinal appendix, however, is somewhat longer than in *Jeffreysii*, and is beset, almost from its origin, with small vesicles, fig. 30, *b*.

The calcareous skeleton — the calcareous ring — is, as in *Ankyr. Jeffreysii*, completely calcined, and hence it is quite impossible to separate one from the other the segments composing it; the sutures, however, when viewed under a lens, appear comparatively distinct. Possibly, the combs both on the radial and the interradial segments project

forreste Rand noget længere. end paa *Jeffreysii,* men nogen anden Forskjel er der heller ikke.

Med Hensyn til Vandkarsystemet, saa ere Tentakelampullerne meget lange ligesom hos *Jeffreysii,* Fig. 30, *c.* Den Poliske Blære er kolbeformig og har en lang Stilk.

Stenkanalen, Fig. 30, *d,* er meget lang og besat med Kalkfletninger lige til dens Udspring fra Vandkarringen, saaledes nemlig, at paa den yderste Halvdel danne Fletningerne Ringe ligesom hos *Troch. Thomsonii.* Madreporpladen danner en liden fremspringende Knop, der er fjernet omtrent 1^{mm} fra Stenkanalens Befæstningssted paa den indre Flade af Kropsvæggen, og ligner den hos *Jeffreysii.*

Kjønsorganerne ere noget forskjellige hos det forskjellige Kjøn.

Hos Hannen er Kjønsorganet overordentlig langt, naar næsten lige til Kloaken, Fig. 30, *e.* Det er fæstet ved et kort, fortykket Mesenterium til Tarmvæggen, just paa det Sted, hvor Maven gaar over i Tarmen, og bestaar af to Hovedstammer, af hvilke den venstre er den korteste; fortil forene de sig og danne en lang Udførselskanal, som løber et langt Stykke ved Siden af Stenkanalen; bagtil forgrener hver Stamme sig i mange tynde, lange cylindriske Blindsække, hvoraf flere vare næsten opfyldte af Zoospermer.

Hunnens Kjønsorganer ere meget kortere, men dog længere end hos *Jeffreysii,* og forsynet med langt flere Blindsække, hvori fandtes en Mængde mere eller mindre udviklede Æg, Fig. 28.

Farven graagrøn med hvid Mundskive, Tentakler, Generationspapille og Halespids hvid.

Findested.

Station 290.

Slægtskarakter. Ankyroderma.

Legemet cylindrisk. Den forreste Ende tvers afskaaren. Mundskiven forsynet med 15 rørformige Forlængelser, afvexlende med 15 aflange Fordybninger, hvori findes 15 papilformige Tentakler. Den bagerste Ende haleformig forlænget. Kloakaabningen omgiven af 5 Papiller. Huden forsynet med gjennemborede Papiller samt særegne Kalklegemer, bestaaende af 5—6 i Stjerneform liggende spatelformede Kalkstave, fra hvis Midte reiser sig et Kalkanker. Ingen Fødder. To Tarmappendices (Lungetræer).

to a greater extent, and the points on the anterior margin may be somewhat longer, than in *Jeffreysii;* other difference there is none.

As regards the aquiferous system, the tentacular ampullæ are exceedingly long, fig. 30, *c.* The vesicle of Poli is clavate in form, and has a long pedicle.

The sand-canal, fig. 30, *d,* is very long, and is furnished with calcareous reticulations that extend to its point of origin on the water-vascular ring, the said reticulations exhibiting on the outer half of the stem an annular arrangement, as in *Trochostoma Thomsonii.* The madreporic body occurs as a small projecting knob, distant about 1^{mm} from the point at which the sand-canal is webbed to the inner wall of the body, and resembles that in *Jeffreysii.*

The generative organs vary somewhat in the different sexes.

The male has the generative organ exceedingly long, reaching almost to the cloacum, fig. 30, *e.* It is webbed by a short, inspissated mesentery to the wall of the intestine, in the exact spot where the stomach opens into the latter, and consists of two stems, that on the left side being the shortest; anteriorly, these stems unite to form a long eferent duct, which passes for a considerable distance alongside the sand-canal; posteriorly, each of the stems divides into numerous long, thin, cylindric cæca, several of which were full of spermatozoa.

In the female, the generative organ is much shorter, but of greater length, however, than in *Jeffreysii,* and furnished with a great many more cæca, in which were found numbers of ova, more or less developed, fig. 28.

Ground-colour grey-green; the oral disk, the tentacles, the papilla of the generative organs, and the tip of the caudiform appendix white.

Locality.

Station 290.

Generic Character: Ankyroderma.

Body cylindric. Anterior extremity truncate. Oral disk furnished with 15 tubular prolations, alternating with as many oblong depressions, in which are 15 papillary tentacula. Posterior extremity caudiform elongate. Cloacal opening surrounded by 5 papillæ. Skin furnished with perforate papillæ, and with characteristic calcareous corpuscles composed of from 5 to 6 spatulate calcareous rods, arranged in a stellar form, from the centre of which protends a calcareous anchor. No suckers. Two intestinal appendices (respiratory trees).

Artskarakter for Ankyroderma Jeffreysii.

Legemet langstrakt, cylindrisk. Den haleformige Forlængelse lang. Tentaklerne yderst smaa, forsynet med 3 Papiller, den midterste størst. Genitalpapillen stor, fremragende. Kalklegemerne i Huden fremtræde under 3 Former: Ankere, fæstede til spateldannede Kalkstave, gjennembrudte Kalkplader med Krone, og ovale, vinrøde Legemer, placerede i Grupper. Hudens Farve, naar Dyret er levende, er grønlig, spillende i det violette med isprængte røde Punkter. Kroppens forreste Ende har en hvid pentagonal Ring, indenfor denne den hvide Mundskive med hvide Tentakler. Genitalpapillen dels gulhvid, dels stærk gul; den haleformige Forlængelse hvid.

Specific Character: Ankyroderma Jeffreysii.

Body elongate, cylindric. Caudiform appendix long. Tentacles exceedingly small, furnished with 3 papillæ, that in the middle largest. Genital papilla large, projecting. The calcareous corpuscles in the skin occur in three typical forms: as anchors webbed to spatulate calcareous rods; as perforate calcareous plates with a corolla; and as oval, vinous-red corpuscles, arranged in groups. Colour of skin in living specimens greenish, bordering on violet, freckled with reddish specks. The anterior extremity of the body marked with a white pentagonal ring, approximating which is seen the white oral disk with its white tentacula. Genital papilla sometimes yellowish-white, sometimes a vivid yellow; caudiform appendix white.

Artskarakter for Ankyroderma affine.

Legemet cylindrisk. Den haleformige Forlængelse kortere end hos Jeffreysii. Tentaklerne yderst smaa med 3 Papiller. Genitalpapillen ikke fremspringende. Paa Hudens Overflade temmelig regelmæssige Rækker af Ankere, fæstede til spateldannede Kalkstave. Imellem disse dels særegne Kalkgrene, fra hvis Fællesudspring (Midtparti) hæver sig enten en treknoppet Krone eller en lang Kalknaal, — dels yderst forskjelligformede, gjennembrudte Kalkplader med Krone, og i det dybere Hudlag en stor Mængde farvefrie, mere eller mindre afrundede Legemer, bestaaende af et Conglomerat af Kalkkorn eller Kalkprismer. Huden grønlig; Mundskiven og Halespidsen hvid.

Specific Character: Ankyroderma affine.

Body cylindric. Caudiform appendix shorter than in *Jeffreysii*. Tentacles exceedingly small, with 3 papillæ. Genital papilla not projecting. On the surface of the skin occur comparatively regular series of anchors, attached to spatulate calcareous rods. Between the latter, are seen characteristic calcareous branches: a three-knobbed corolla, or a long calcareous spicule, springing from their common origin (the central portion); also perforate calcareous plates with a corolla, varying greatly in form; and in the deepest tegumentary layer large numbers of colourless, more or less rounded corpuscles, consisting of a conglomeration of calcareous granules, or calcareous prisms. Skin greenish; oral disk and tip of caudiform appendix white.

Foruden de af Professor Semper i hans Reiseværk opstillede Slægter, henhørende til Molpadidernes Familie, have vi fundet det nødvendigt at opstille to nye Slægter, hvis Hjem er de arctiske Have. Af Molpadider fra disse existere (foruden de af os beskrevne), saavidt os bekjendt, kun 3 Arter, hvoraf den ene blev fundet ved Vest-Finmarkens Kyster, den anden ved Novaja Semblia og den tredie ved Nord-Amerika; desforuden forekommer der ved Kerguelens Land en Molpadide, nemlig *Molpadia violacea,* Studer, som efter al Sandsynlighed er identisk med Sars's *Molpadia borealis.* Saavel denne som *Molpadia oolitica,* Pourt., og *Haplodactyla arctica,* Marenzeller, maa henføres til den af os opstillede Slægt *Trochostoma.*

Hvad der frembyder en særlig Interesse ved den af

Exclusive of the genera established by Professor Semper in his "Travels" as belonging to the family *Molpadidæ,* we have found it necessary to institute two new genera inhabiting the Polar Seas. Three species only of *Molpadidæ,* exclusive of those here described, have their habitat, so far as we are aware, in those regions, one of which has been met with off the coast of West Finmark, the other on that of Nova Zemlja, and the third off the shores of North America; a *Molpadia* occurs, too, off Kerguelen, viz. *Molpadia violacea,* Studer, which in all probability is identical with Sars's *Molpadia borealis.* The latter, no less than *Molpadia oolitica,* Pourt., and *Haplodactyla arctica,* Marenzeller, must be referred to our new genus *Trochostoma.*

The genus *Ankyroderma* has proved specially inter-

os beskrevne Slægt *Ankyroderma*, er at den danner ligesom et Led imellem Synaptiderne og Molpadiderne, idet der i Huden er de for Slægten *Synapta* saa karakteristiske Ankere, imedens den forøvrigt har Molpadidens Karakter.

For at faa en bedre Oversigt over Arterne af Slægterne *Trochostoma* og *Ankyroderma*, skulle vi nu i Korthed give en Karakteristik af dem.

esting, forming as it does, a kind of transition link between the *Synaptidæ* and the *Molpadidæ;* for the skin is furnished with the anchors so characteristic of the genus *Synapta*, whereas in other respects it agrees with *Molpadia*.

In conclusion, we will briefly characterize the several species comprised in the genera *Trochostoma* and *Ankyroderma*.

Uden Kloak.

Trochostoma Thomsonii. Tentakler smaa. Hudens Farve bleg-violet, brunlig Afskygning paa Bugfladen. I Corium dels ovale, violette eller farvefri, dels elliptiske mørk-vinrøde Kalklegemer, spredte imellem de gjennembrudte Kalkplader med Krone.

Without a Cloacum.

Trochostoma Thomsonii. Tentacles small. Colour of skin pale violet, tinged with brownish on the ventral surface. Embedded in the corium, and scattered between the perforate calcareous plates with a corolla, are calcareous corpuscles, some oval in form, violet or colourless, some elliptic-shaped, of a dark vinous red.

Med Kloak.

Trochostoma boreale, Sars. Tentaklerne smaa. Farven jevn mørk-violet. I Corium gjennembrudte Kalkplader med Krone, indenfor disse et tæt Lag dels ovale, dels mere runde, mørk-vinrøde Kalklegemer.

Trochostoma arcticum, Marenz. Tentaklerne store med 4—6 Papiller. Hudens Farve graagrøn, spillende lidt i det violette. I Corium kun gjennembrudte Kalkplader med Krone.

With a Cloacum.

Trochostoma boreale, Sars. Tentacles small. Colour a uniform dark-violet. Embedded in the corium, perforate calcareous plates with a corolla; underneath the latter, a compact layer of calcareous corpuscles, some oval, some roundish, in colour a dark vinous red.

Trochostoma arcticum, Marenz. Tentacles large, with 4—6 papillæ. Colour of skin greyish-green, bordering on violet. In the corium, only perforate calcareous plates with a corolla.

Trochostoma (Molpadia) ooliticum, Pourt.

Tentaklerne smaa. Farven violet. I Corium temmelig store, ovale Kalklegemer. Ingen Kalkplader.

Trochostoma (Molpadia) ooliticum, Pourt.

Tentacles small. Colour violet. Embedded in the corium, comparatively large oval calcareous corpuscles. No calcareous plates.

Ankyroderma Jeffreysii, n. g., n. sp.

Yderst smaa Tentakler. Hudens Farve violet med isprængte røde Punkter. Overalt paa Kroppen gjennemborede Papiller. Genitalpapillen stærkt fremstaaende. I Corium stjerneformige Kalklegemer med Ankere, imellem disse gjennembrudte Kalkplader med Krone, samt gruppevis ovale, mørk-vinrøde Kalklegemer.

Ankyroderma Jeffreysii, n. g., n. sp.

Exceedingly small tentacles. Colour of skin violet, flecked with red. On all parts of the body perforate papillæ. Genital papilla very projecting. Embedded in the corium, stellate calcareous corpuscles, with anchors, between which are perforate calcareous plates with a corolla, and, grouped together, oval calcareous corpuscles, of a dark vinous red.

Ankyroderma affine, n. sp.

Yderst smaa Tentakler. Hudens Farve grønlig. Overalt paa Kroppen gjennemborede Papiller samt temmelig regelmæssige Rækker af Ankere fæstede til spateldannede stjerneformigt liggende Kalkstave. Imellem disse dels særegne med Udløbere forsynede Kalklegemer, dels gjennembrudte Kalkplader med Krone, og indenfor dem (dybere) et Lag farvefrie Kalkklumper.

Ankyroderma affine, n. sp.

Tentacles exceedingly small. Colour of skin greenish. On all parts of the body perforate papillæ, together with comparatively regular series of anchors, attached to spatulate stellar calcareous rods. Between these rods are calcareous corpuscles, furnished with offshoots; also perforate calcareous plates with a corolla, and underneath these plates (deeper down in the integument), a layer of colourless calcareous lumps.

Fortegnelse

over de Holothurider, som ere fundne paa Nordhavsexpeditionen.

1. **Cucumaria (Holothuria) frondosa,** Gun. Acta Holm, 1767, pag. 115. Tab. 4. Fig. 1, 2.
   Holothuria pentactes, Abildg. Zoolog. dan. Tab. 108, Fig. 1—4. Tab. 123—127.
   Cucumaria frondosa, Düb. et Koren. K. Vetensk. Akademiens Handl. 1844. Tab. 4. Fig. 1.
   Station 280 og 322. Bjørnø i stor Mængde.

2. **Cucumaria (Holothuria) minuta,** Fabr. Fauna grœnlandica pag. 354—55.
   — **minuta,** Lütk. Oversigt over Grønlands Echinodermata. Kjøbenhavn 1857. pag. 7—8.
   Station 336. Spitsbergen. 1 Exemplar.

3. **Echinocucumis typica,** Sars. Oversigt over Norges Echinodermer. Christiania, 1861, p. 102. Tab. 10. Fig. 11—20. Tab. 11, Fig. 1—17.
   Station 1, 9, 101, 149. Overalt temmelig sparsomt.

4. **Thyonidium (Cucumaria) hyalinum,** Forb. Hist. of Brit. Starf., pag. 221, Fig.
   — **pellucidum,** Düb. & Koren. Skand. Echinodermer pag. 303. Tab. 11, Fig. 57.
   Station 35. Kun et Exemplar, og dette var saa ødelagt, at vi nærer Tvivl om, hvorvidt det virkelig var *Th. hyalinum.*

5. **Thyone (Holothuria) fusus,** Müll. Zoolog. dan. 1 Fasc. pag. 11. Tab. 10. Fig. 5, 6.
   — **fusus,** Koren. Nyt Magaz. f. Naturvid. 4 B., pag. 203. Tab. 1.
   — **fusus,** Düb. et Koren. K. Vetensk. Akademiens Handl. 1844. Skand. Echinod. pag. 308. Tab. 11, Fig. 52.
   Station. Røst, Lofoten. To Exemplarer.

6. **Thyone raphanus,** Düb. et Koren. Skand. Echino-

List

of the Holothurians collected on the Norwegian North-Atlantic Expedition.

1. **Cucumaria (Holothuria) frondosa,** Gun. Acta Holm, 1767, p. 115, Pl. 4, figs. 1, 2.
   Holothuria pentactes, Abildg. Zoolog. dan. Pl. 108, figs. 1—4; Pl. 123—127.
   Cucumaria frondosa, Düb. et Koren. K. Vetensk. Akademiens Handl., 1844. Pl. 4, fig. 1.
   Stations 280 and 322. At Bjørnø in great abundance.

2. **Cucumaria (Holothuria) minuta,** Fabr. Fauna grœnlandica, pp. 354, 355.
   — **minuta,** Lütk. Oversigt over Grønlands Echinodermata. Kjøbenhavn 1857, pp. 7, 8.
   Station 336, Spitzbergen. 1 Specimen.

3. **Echinocucumis typica,** Sars. Oversigt over Norges Echinodermer. Christiania, 1861, p. 102, Pl. 10, figs. 11—20; Pl. 11, figs. 1—17.
   Stations 1, 9, 101, 149. In each locality somewhat rare.

4. **Thyonidium (Cucumaria) hyalinum,** Forb. Hist. of Brit. Starf., p. 221, fig.
   — **pellucidum,** Düb. et Koren. Skand. Echinodermer, p. 303, Pl. 11, fig. 57.
   Station 35. Only one Specimen, and that so mutilated as to render it doubtful whether the animal was really *Th. hyalinum.*

5. **Thyone (Holothuria) fusus,** Müll. Zoolog. dan. 1 Fasc., p. 11, Pl. 10, figs. 5, 6.
   — **fusus,** Koren. Nyt Magaz. f. Naturvid. Vol. 4, p. 203, Pl. 1.
   — **fusus,** Düb. et Koren. K. Vetensk. Akademiens Handl., 1844. Skand. Echinod., p. 308, Pl. 11, fig. 52.
   Station: Røst (Lofoten). Two Specimens.

6. **Thyone raphanus,** Düb. et Koren. Skand. Echinod.,

dermer pag. 311. Tab. 11, Fig. 58, 59. Tab. 5. Fig. 49—55.

Station. Balestrand. Sognefjord, samt 79. Begge Steder nogle faa Exemplarer.

7. **Psolus (Holothuria) phantapus,** Strussf. Acta Holm, 1765, pag. 256. Tab. 10.
   Holothuria phantapus, Müll. Zool. dan. 3 Fasc. pag. 54. Tab. 112, 113.
   Cuvieria phantapus, Düb. et Koren. Skand. Echinodermer, pag. 313.
   Psolus phantapus, Lütk. Grønlands Echinodermata, pag. 12.

Station 261. Tanafjord, Finmarken. Kun en liden Unge.

8. **Cuvieria Fabricii,** Düb. et Koren. Skand. Echinodermer pag. 316.
   Holothuria sqvamata, Fabr. Fauna Grœnland. No. 348.
   Psolus Fabricii, Lütk. Grønlands Echinodermata, pag. 13.

Station 267, 270. Et Exemplar paa hver Station.

9. **Cuvieria sqvamata,** Koren. Nyt Magaz. f. Naturvid. Christiania, 4 B., pag. 211. Tab. 2, 3.
   — **sqvamata,** Düb. et Koren. Skand. Echinodermer pag. 315. Tab. 4, Fig. 35—41.

Station. Balestrand. Sognefjord. Nogle Exemplarer.

10. **Holothuria intestinalis,** Ascan. et Rathke. Icon. rer. nat. Fasc. 5, pag. 5. Tab. 45.
    — **mollis,** Sars. Beskr. og Iagtt. pag. 40.
    — **intestinalis,** Düb. et Koren. Skand. Echinodermer, pag. 320. Tab. 4, Fig. 28—33.

Station 2. Nogle Exemplarer.

11. **Holothuria tremula,** Gunn. Acta Holm, 1767, pag. 119. Tab. 4, Fig. 3.
    — **elegans,** Müll. Zoolog. dan. Fasc. 1, pag. 1. Tab. 1—3.
    — **tremula,** Düb. et Koren. Skand. Echinod. pag. 319. Tab. 4, fig. 24—27.

Station 2, 10, 25, 92. Paa Station 10 mange Exemplarer.

12. **Stichopus natans,** Sars. Fauna littoralis Norvegiæ, 3 Hefte, pag. 58. Tab. 7. Fig. 18—41. Bergen 1877.

Station 2, Sognefjord, temmelig hyppig. Station 10 enkelte Exemplarer.

13. **Eupyrgus scaber,** Lütken. Oversigt over Grønlands Echinodermata, pag. 22.
    — **(Echinosoma) scaber,** Semper. Reisen d. Archipel der Philippinen, 1 B. Holothurien pag. 234.

Station 267, 273, 338. Kun enkelte Exemplarer.

p. 311, Pl. 11, figs. 58, 59; Pl. 5, figs. 49, 55.

Stations: 79 and Balestrand (Sognefjord). A few Specimens from both localities.

7. **Psolus (Holothuria) phantapus,** Strussf. Acta Holm, 1765, p. 256, Pl. 10.
   Holothuria phantapus, Müll. Zoolog. dan. 3 Fasc. p. 54, Pl. 112, 113.
   Cuvieria phantapus, Düb. et Koren. Skand. Echinod. p. 313.
   Psolus phantapus, Lütk. Grønlands Echinodermata, p. 12.

Station 261 (the Tanafjord, Finmark). A very young individual.

8. **Cuvieria Fabricii,** Düb. et Koren. Skand. Echinod. p. 316.
   Holothuria sqvamata, Fabr. Fauna Grœnland. No. 348.
   Psolus Fabricii, Lütk. Grønlands Echinodermata, p. 13.

Stations 267 and 270. A Specimen from each locality.

9. **Cuvieria sqvamata,** Koren. Nyt Magaz. f. Naturvid., Christiania, Vol. 4 p. 211, Pl. 243.
   — **sqvamata,** Düb. et Koren. Skand. Echinod. p. 315, Pl. 4, figs. 35—41.

Station: Balestrand (Sognefjord). A few Specimens.

10. **Holothuria intestinalis,** Ascan. et Rathke. Icon. rer. nat. Fasc. 5, p. 5, Pl. 45.
    — **mollis,** Sars. Beskr. og Iagtt. p. 40.
    — **intestinalis,** Düb. et Koren. Skand. Echinod. p. 320, Pl. 4, figs. 28—33.

Station 2. A few Specimens.

11. **Holothuria tremula,** Gun. Acta Holm, 1767, p. 119, Pl. 4, fig. 3.
    — **elegans,** Müll. Zoolog. dan. Fasc. 1, p. 1, Pl. 1—3.
    — **tremula,** Düb. et Koren. Skand. Echinod. p. 319, Pl. 4, figs. 24—27.

Stations 2, 10, 25, 92. At Station 10 numerous Specimens.

12. **Sticopus natans,** Sars. Fauna littoralis Norvegiæ, Part 3, p. 58, Pl. 7, figs. 18—41. Bergen 1877.

Station 2 (Sognefjord). Comparatively abundant; 10 Specimens.

13. **Eupyrgus scaber,** Lütk. Oversigt over Grønlands Echinodermata, p. 22.
    — **(Echinosoma) scaber,** Semper. Reisen d. Archipel der Philippinen, Vol. 1, Holothurien, p. 234.

Stations 267, 273, 338. Only a few Specimens.

14. **Trochostoma Thomsonii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1878. 24de B., pag. 229. Tab. 1—3.

Station 18. To Unger. 137, 192. 270, 312, 362. Paa de fleste Stationer enkelte Exemplarer; paa nogle 2—3 Exempl.

15. **Trochostoma (Haplodactyla) arcticum,** Marenzeller. Denkschriften der k. k. Academie der Wissenschaften, Wien 1878, 35 B., pag. 385. Tab. 4, Fig. 1.

— **arcticum,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 126. Tab. 5, Fig. 6—10.

Station 260, 261 (Porsanger- og Tanafjord, Finmarken) flere Exemplarer. Stat. 323 et Par meget store Exempl.

16. **Ankyroderma Jeffreysii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 128. Tab. 6.

Station 260, 261, 262 (Porsanger- og Tanafjord), 362. I de to Finmarksfjorde levede den sammen med *Trochostoma arcticum.* Nogle Exemplarer.

17. **Ankyroderma affine,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 133. Tab. 6.

Station 290. To Exemplarer.

18. **Acanthotrochus mirabilis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 115. Tab. 3, 4.

Station 283, 295, 312. 4 Exemplarer.

19. **Myriotrochus Rinkii,** Stenst. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn 1851, pag. 55. Tab. 3, Fig. 7—10.

— **Rinkii,** Lütk. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn 1857, pag. 21.

— **Rinkii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 107, Tab. 3.

Station. Spitzbergen, Norskøerne, 30 Favne, Lerbund. Magdalena-Bay, 50—60 Favne, Lerbund, og Advent-Bay, 20—30 Favne, Lerbund. Paa de to sidste Steder i stor Mængde.

20. **Myriotrochus (Chirodota) brevis,** Huxley. Journal of a Voyage in Baffin's Bay and Barrow-Strait in the year 1850—51 by P. C. Sutherland, Vol. 11, Appendice, pag. 221.

Oligotrochus vitreus, Sars. Fauna littoralis Norvegiæ. Bergen 1877. 3 Hefte, pag. 49. Tab. 7, Fig. 1.

14. **Trochostoma Thomsonii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1878. Vol. 24. p. 229. Pl. 1—3.

Stations 18 (two young Specimens). 137, 192, 270, 312, 362. From most of these localities solitary Specimens; from some, two or three.

15. **Trochostoma (Haplodactyla) arcticum,** Marenz. Denkschriften der k. k. Academie der Wissenschaften, Wien 1878, Vol. 35, p. 385, Pl. 4, fig. 1

— **arcticum,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p 126, Pl. 5. figs. 6—10.

Stations 260, 261 (the Porsanger and Tana Fjords, Finmark); several Specimens; at Station 323 two very large examples.

16. **Ankyroderma Jeffreysii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p. 128, Pl. 6.

Stations 260, 261, 262 (the Porsanger and Tana Fjords), 362. In the two Finmark fjords it occurred along with *Trochostoma arcticum.* A few Specimens.

17. **Ankyroderma affine,** Dan et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p. 133, Pl. 6.

Station 290. Two Specimens.

18. **Acanthotrochus mirabilis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p. 115, Pl. 3 & 4.

Stations 283, 295, 312. Four Specimens.

19. **Myriotrochus Rinkii,** Stenst. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn 1851, p. 55, Pl. 3, figs. 7—10.

— **Rinkii,** Lütk. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn 1857, p. 21.

— **Rinkii,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p. 107, Pl. 3.

Stations (Spitzbergen): — Norsk Islands, 30 fathoms, clay bottom; Magdalena Bay, 50—60 fathoms, clay bottom; and Advent Bay, 20—30 fathoms, clay bottom. In the two latter localities abundant.

20. **Myriotrochus (chirodota) brevis,** Huxley. Journal of a Voyage in Baffin's Bay and Barrow Strait in the year 1850—1851, by P. C. Sutherland; Vol. II, Appendix, p. 221.

Oligotrochus vitreus, Sars. Fauna littoralis Norvegiæ. Bergen 1877, Part 3, p. 49, Pl. 7, fig. 1.

Myriotrochus Rinkii, Théel. Note zur quelques Holothuries des Mers de la Nouvelle Zemble, Upsala 1877.
— **brevis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 111. Tab. 3.
Station 270.

21. **Synapta (Holothuria) inhærens,** Müll. Zoolog. dan. 1 Fasc. pag. 35. Tab. 31. Fig. 1—7.
— **inhærens,** Düb. et Koren. Skand. Echinod., pag. 322. Tab. 5. Fig. 56—62.
— **inhærens,** Woodw. et Barrett. Annal. Magaz. Nat. Hist. 3 Ser. Vol. 3, pag. 214. London 1859.
Station 260. Porsangerfjord.

22. **Synapta tenera?** Norman.
Et Par beskadigede Exempl. ved Husøen, Sognefjord.

23. **Elpidia glacialis,** Théel. Mémoire sur l'Elpidia, par H. Théel. Kongl. svenska Vetensk. Akademiens Handl. B. 14, No. 8.
— **glacialis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. 25 B., pag. 100.
Station 35. Et Par Exempl. 40. Flere Exempl. 51. Nogle mindre Exempl. 53. Mange store Exempl. 96. To smaa Exempl. 240. Nogle yderst smaa Exempl. 248. Et yderst lidet Exempl. 295. Nogle Exempl. 303. En Del Exempl. 353. Nogle Exempl.

24. **Irpa abyssicola,** Dan. et Koren. Nyt Magazin f. Naturvid. Christiania 1878, pag. 257. Tab. 4, Fig. 1—3.
Station 35. Et Exemplar.

25. **Kolga hyalina,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, pag. 83. Tab. 1, 2.
Station 295. Endel Exempl. 303. I stor Mængde. 353. Nogle Exempl.

Myriotrochus Rinkii, Théel. Note sur quelques Holothuries des Mers de la Nouvelle Zemble, Upsala 1877.
— **brevis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879. Vol. 25, p. 111, Pl. 3.
Station 270.

21. **Synapta (Holothuria) inhærens,** Müll. Zoolog. dan. 1 Fasc., p. 35, Pl. 31, figs. 1—7.
— **inhærens,** Düb. et Koren. Skand. Echinod., p. 322, Pl. 5, figs. 56—62.
— **inhærens,** Woodw. et Barrett. Annal. Magazine Nat. Hist. Ser. 3, Vol. 3, p. 214. London 1859.
Station 260 (Porsangerfjord).

22. **Synapta tenera?** Norman.
Two mutilated Specimens. from Husø in the Sognefjord.

23. **Elpidia glacialis,** Théel. Mémoire sur l'Elpidia, par H. Théel. Kongl. svenska Vetensk. Akademiens Handl., Vol. 14, No. 8.
— **glacialis,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, Vol. 25, p. 100.
Stations 35 (one or two Specimens), 40 (several Specimens), 51 (a few small Specimens), 53 (numerous large Specimens), 96 (two small Specimens), 240 (a few very small Specimens), 248 (a very small Specimen), 295 (a few Specimens), 303 (several Specimens), 353 (a few Specimens).

24. **Irpa abyssicola,** Dan. et Koren. Nyt Magazin f. Naturvid. Christiania 1878, p. 257, Pl. 4, figs. 1—3.
Station 35. One Specimen.

25. **Kolga hyalina,** Dan. et Koren. Nyt Magaz. f. Naturvid. Christiania 1879, p. 83, Pl. 1 & 2.
Stations 295 (several Specimens), 303 (numerous Specimens), 353 (a few Specimens).

Sammenstilling imellem Finmarkens, Det norske Havs, Grønlands, Spitsbergens og Novaja Semljas Holothurider.

(Tabular Specification of the Holothurians found in the Norwegian Sea and off the coasts of Finmark, Greenland, Spitzbergen, and Novaja Zemlja).

Arter. (Species.)	Finmarken. (Finmark.)	Det norske Hav. (Norwegian Sea.)	Grønland. (Greenland.)	Spitsbergen. (Spitsbergen.)	Novaja Semlja. (Novaja Zemlja.)
Cucumaria frondosa, Gunn.	1	—	1	1	1
— *minuta,* Fabr.	—	—	1	1	1
— *Korenii,* Lütk.	—	—	1	—	1
Orcula Barthii, Trosch.	—	—	1	—	1
Echinocucumis typicus, Sars.	1	—	—	—	—
Thyonidium hyalinum, Forb.	1	1?	—	1	—
Psolus phantapus, Strussf.	1	—	1	—	—
Cuvieria Fabricii, Düb. & Koren.	—	—	1	—	1
Holothuria intestinalis, Asc. & Rath.	1	—	—	—	—
— *ecalcarea,* Sars.	1	—	—	—	—
Eupyrgus scaber, Lütk.	—	—	1	—	1
Trochostoma Thomsonii, Dan. & Koren.	—	1	—	—	—
— *boreale,* Sars.	1	—	—	—	1?
— *arcticum,* Marenz.	1	—	—	—	1
Ankyroderma Jeffreysii, Dan. & Koren.	1	—	—	—	—
— *affine,* Dan. & Koren.	1	—	—	—	—
Trochoderma elegans, Théel.	—	—	—	—	1
Acanthotrochus mirabilis, Dan. & Koren.	—	1	—	—	—
Chirodota lævis, Fabr.	1	—	1	—	—
Myriotrochus Rinkii, Steenst.	—	—	1	1	1
— *brevis,* Huxl.	1	—	—	—	1
Synapta inhærens, Müll.	1	—	—	—	—
Elpidia glacialis, Théel.	—	1	—	—	1
Irpa abyssicola, Dan. & Koren.	—	1	—	—	—
Kolga hyalina, Dan. & Koren.	—	1	—	—	—
	13	6	9	4	12

Efter at ovenstaaende Sammenstilling var affattet, have vi erfaret af en Afhandling af Axel Ljungman i Öfversigt af Kongl. Vetenskaps Akademiens Förhandlingar 1879, No. 9, at følgende Arter ere komne til Spitsbergens Fauna:

1. *Cucumaria fucicola,* Forb. & Goodsir.
2. — *glacialis,* Ljungman.
3. *Psolus phantapus,* Strussf.
4. *Eupyrgus scaber,* Lütken.
5. *Chirodota lævis,* Fabr.

Shortly after the above Specification had been drawn up, we learnt from a paper by Axel Ljungman in Öfversigt af Kongl. Vetenskaps Akademiens Förhandlingar, 1879, No. 9, that the Marine Fauna of Spitzbergen also includes the following species: —

1. *Cucumaria fucicola,* Forb. & Goodsir.
2. — *glacialis,* Ljungman.
3. *Psolus phantapus,* Strussf.
4. *Eupyrgus scaber,* Lütken.
5. *Chirodota lævis,* Fabr.

Fortegnelse

over de Arbeider, der væsentligst ere benyttede ved vor Afhandling over Holothuriderne.

List

of the principal Works consulted in preparing this Memoir.

Bauer, Alb. Beiträge zur Naturgeschichte der Synapta digitata. 3 Abhandlungen. Mit 8 Taf. Nova Acta Acad. Caes. Leop.-Carol. Tom. XXXI, Dresden 1864.

Brandt, J. F. Prodromus descriptionis animalium ab H. Mertensio in orbis terrarum circumnavigatione observatorum. Fasciculus 1. Petersburg 1835.

Düben, M. W. von och **J. Koren.** Öfversigt af Skandinaviens Echinodermer. Kongl. Vetenskaps-Akademiens Handlingar för År 1844. Stockholm 1846, pp. 229—328. Pl. 6—11.

Forbes, Edward. A History of British Starfishes and other animals of the class Echinodermata. London 1841.

Grube, Ad. Ed. Actinien, Echinodermen und Würmer des Adriatischen und Mittelmeeres. Königsberg 1840. Mit 1 Taf.

— Ueber die Holothurien-Gattungen Chirodota und Synapta. Müllers Archiv 1850, p. 111.

Koren, Joh. Beskrivelse over Thyone fusus og Cuvieria sqvamata. Nyt Magaz. f. Naturvid. Christiania 1845, Vol. 4, p. 203. Med 3 Tavler.

Leydig, Fr. Anatomische Notizen über Synapta digitata. Müllers Archiv 1852, p. 507, Taf. XIII.

Ludwig, Hubert. Beiträge zur Kenntniss der Holothurien. Mit 2 Taf. Würzburg 1874.

Lütken, Chr. Fr. Oversigt over Grønlands Echinodermata. Kjøbenhavn 1857.

— Et Bidrag til Kundskab om Spitsbergens Echinoderm-Fauna. Vidensk. Meddelelser fra den naturhist. Forening i Kjøbenhavn 1871.

Marenzeller, Emil v. Die Coelenteraten, Echinodermen und Würmer der K. K. österreichisch-ungarischen Nordpol-Expedition. Denkschriften der K. Academie der Wissenschaften. Wien 1878, Vol. 35, p. 385, Taf. 4.

Müller, Joh. Ueber Synapta digitata und über die Erzeugung von Schnecken in Holothurien. Mit 10 Taf. Berlin 1852.

— Ueber den Bau der Echinodermen (Abhandlungen der Kgl. Acad. der Wissenschaften zu Berlin aus d. Jahre 1853). Berlin 1854. Mit 9 Taf.

Müller, Otto Fr. Zoologia Danica.

Pourtales, L. F. On the Holothuriæ of the Atlantic Coast of the United States. Proceed. Am. Assoc. Adv. Sc. 5th Meet. Washington 1851, p. 8.

Sars, M. Oversigt af Norges Echinodermer. Christiania 1861. Med 16 Plancher.

— Fauna littoralis Norvegiæ. Bergen 1877, Part 3, p. 49.

Selenka, E. Beiträge zur Anatomie u. Systematik der Holothurien. Zeitschr. f. wiss. Zoologie, 1867, Vol. XVII, p. 291.

— Nachtrag zu den Beiträgen zur Anat. u. Systematik der Holothurien. Zeitschr. f. w. Zool. 1868, Vol. XVIII, p. 109.

Semper, C. Reisen im Archipel der Philippinen, 11 Theil. Wissenschaft. Resultate, 1 Bd., Holothurien. Mit 40 Taf. Leipzig 1868.

Steenstrup, Japet. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn 1851, p. 55, Pl. 3.

Studer, Th. Ueber Echinodermen aus dem antarctischen Meere, Monatsberichte der K. preuss. Acad. der Wissenschaften zu Berlin 1877, p. 454.

Stuxberg, A. Echinodermer från Novaja Semljas haf. samlade under Nordenskjöldska expeditionerna 1875 och 1876. Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar 1878. No. 3. p. 27. Pl. VI: Stockholm.

Teuscher, R. Beiträge zur Anatomie der Echinodermen. Jenaische Zeitschrift f. Naturwiss. Vol. X. Jena 1876. p. 243. Taf. VII & VIII. p. 493. Taf. XVIII—XXII.

Théel, J. H. Memoire sur l'Elpidia, nouveau genre d'Holothuries. Kongl. Sv. Vetenskaps-Akademiens Handlingar. Vol. 14, No. 8, pp. 1—30. Tab. I—V.

Théel, J. H. Notes sur quelques Holothuries des Mers de la Nouvelle Zemble. Upsala 1877.

Tiedemann, Fr. Anatomie der Röhren-Holothurien, des pommeranzfarbigen See-Sterns und des Stein-See-Igels. Mit 10 Tafeln. Landshut 1816.

Forklaring over Figurerne.

Tab. I, Fig. 1. *Kolga hyalina* i naturlig Størrelse, seet fra Siden. *a* Rygkraven; *b* Analaabningen.

— 2. *Kolga hyalina* i naturlig Størrelse, seet fra Bugsiden. *a* Mundaabning; *b* Tentakel; *c* Fod; *d* Fodampulle; *e* Muskelbaand; *f* Længdemuskel med den gjennemskinnende Radialnerve.

— 3. *Kolga hyalina* i naturlig Størrelse, seet fra Siden.

— 4. *Kolga hyalina* i forkortet Stilling.

— 5. *Kolga hyalina,* seet halvt fra Bug-, halvt fra Rygsiden.

— 6. Mundskiven med sine Tentakler, lidt forstørret.

— 7. En Tentakel med sine 5 Lapper, enhver Lap delt i 3 Flige, forstørret.

— 8. *Kolga hyalina,* aabnet fra Ryggen; den forreste Del af Kropshuden slaaet op, forstørret. *a* Maven; *b* Indsnittet mellem Maven og Tarmen; *c* 1ste Tarmslynge; *d* 2den; *e* 3die Tarmslynge; *u* Svælgsinus; *g* Kloakens Tragtform; *h* Kloaken; *i* Stenkanalen; *k* dennes Tilfæstning til Kropshuden; *l* Kravens Diaphragma med dettes Aabninger; *m* Blodkarringen, der omgiver Svælget; *n* Rygkarret ved sit Udspring fra Ringkarret; *o, o* Rygkarret paa første og sidste Tarmslynge; *p* Anastomoser imellem Bugkarrets Grene; *q* Kjønsorganets Ligament; *r, s* de to Stammer af Kjønsorganet; *t* Udførselsgangen for dette; *f* Kloaken.

— 9. En Del af Vandkarsystemet, seet fra Bugsiden, forstørret. *a, a* Kalkringens Stykker, liggende i deres naturlige Leie; *b* Vandkarringen; *c, c* Hovedstammer; *d* deres Deling i 2; *e, e* deres Deling i 3; *f* Poliske Blære.

— 10. Et Stykke af Huden med dens Kalk-

Explanation of the Plates.

Pl. I, fig. 1. *Kolga hyalina,* natural size, side aspect: *a* dorsal collar; *b* anal opening.

— 2. *Kolga hyalina,* natural size, ventral aspect: *a* oral opening; *b* a tentacle; *c* a sucker; *d* pedal ampulla; *e* muscular band; *f* one of the longitudinal muscles with radial nerve shining through.

— 3. *Kolga hyalina,* natural size, lateral aspect.

— 4. *Kolga hyalina,* foreshortened.

— 5. *Kolga hyalina,* partly ventral, partly dorsal aspect.

— 6. Oral disk with tentacles, slightly magnified.

— 7. A tentacle with its 5 lobes, each lobe divided into 3 lobules; magnified.

— 8. *Kolga hyalina,* opened dorsally; anterior part of integument folded back; magnified: *a* ventricle; *b* incision between the ventricle and the intestine; *c* 1st convolution of intestine; *d* 2nd; *e* 3rd; *u* pharyngeal sinus; *g* funnel-shaped aspect of cloacum; *h* cloacum; *i* sand-canal; *k* attachment of latter organ to skin of body; *l* diaphragm of collar with the openings; *m* ring of blood vessels encircling œsophagus; *n* dorsal vessel at point of origin from the annular vessel; *o, o* dorsal vessel on first and last convolutions of the intestine; *p* anastomosing branches between the dorsal and ventral vessels; *q* ligament of generative organ; *r, s* the two stems of the generative organ; *t* eferent duct from the latter; *f* cloacum.

— 9. Part of the aquiferous system, ventral aspect; magnified: *a, a* segments of calcareous ring *in situ; b* water-vascular ring; *c, c* its principal stems; *d* their dichotomous, *e, e* their trichotomous division; *f* vesicle of Poli.

— 10. A piece of the skin with its calcareous

spikler, forstørret. *a* Krumme, isolerede Spikler; *b* Spikelhobe.

Tab. I, Fig. 11. Et Tversnit af Huden, forstørret. *a* Cuticula; *b* Epithel; *c* Slimkjertler; *d, d* det kornede seige Indhold i disse; *e, e* Bindevævslegemer; *f* sammenhobede Kalkspikler; *h* Radialnerven; *i* Sammenvoxning imellem Nervekarret og Nervens ydre Side; *k* det aabne Nervekar; *l* Bindevævsliste; *m* det brede, lyse, fibrillære Lag i Nerven; *n* det smalere, mørke Lag i Nerven.

Tab. II, Fig. 12. Den forreste Kropsende, seet fra den indvendige Side, forstørret. *a* Mundskiven; *b, b* Biviets Længdemuskler med Radialnerven; *c, c, c* Triviets Længdemuskler med Radialnerven; *d* Vandkarringen; *e* Stenkanalen; *f* Generationsorganet; *g* Spiserøret; *h* Diaphragmaet med dets Aabninger.

— 13. Rygpapille med sine Spikler, forstørret.

— 14. Den yderste Del af en Fod med Kalkspikler, forstørret.

— 15. Forskjellige indre Dele, forstørrede. *a* Vandkarringen; *b, b* Rygstammerne med deres Todeling; *c, c, c* de trende Grene af Sidekarret; *d* Stenkanalen; *e* Generationsorganets Udførselsgang; *f* Generationsorganet med dets Forgreninger; *g* Spiserøret; *h* Poliske Blære.

— 16. Den yderste Ende af Stenkanalen, tilhørende *Elpidia glacialis*, Théel. *a* Kalkfletning, der omgiver en Del af Endens Fæstested, forstørret.

— 16[1]. Den nævnte Fletning, stærkt forstørret.

Fig. 17 & 18. Otolither, forstørrede. *a* Det yderste Lag; *b* rundagtig Fremstaaenhed.

— 19 & 20. Forskjelligtformede Kalkfigurer i Mundskivens Hud.

Fig. 21. Kalknet i Mundskivens Hud, forstørret.

— 22. Spikelfletninger i Huden, forstørrede.

— 23. Forskjelligtformede Kalkspikler i Huden, forstørrede.

— 24. Forgrenede Kalkspikler, forstørrede.

— 25. Slimceller, forstørrede. *a* Halvmaaneformigt Indsnit.

Tab. III, Fig. 26. Schematisk Figur over den indre Bugflade af Huden samt en Del af Nervesystemet. *a, a* Tvermuskler; *b* Fodampulle; *c, c* Høreblærer; *d* Radialnerve; *e* Længdemuskel med Radialnerve; *f, f* Muskelbaand fra Fodampullen; *g* en Del af Nerveringen; *h, h* Fødder.

spicules, magnified: *a* curved isolated spicules; *b* groups of spicules.

Pl. I, fig. 11. Transverse section of skin, magnified: *a* cuticle; *b* epithelium; *c* mucous glands; *d, d* their viscid, granulous contents; *e, e* corpuscles of connective tissue; *f* agglomerated calcareous spicules; *h* radial nerve; *i* (connate) connexion between the nervous vessel and the exterior surface of the nerve; *k* the open nervous vessel; *l* fillets of connective tissue; *m* the broad, fibrillous, light-coloured layer in the substance of nerve; *n* the smaller, dark layer.

Pl. II, fig. 12. Anterior extremity of body, inner aspect; magnified: *a* oral disk; *b, b* longitudinal muscles of bivium with radial nerve; *c, c, c* longitudinal muscles of trivium with radial nerve; *d* water-vascular ring; *e* sand-canal; *f* generative organ; *g* œsophagus; *h* diaphragm with its openings.

— 13. Dorsal papilla with spicules, magnified.

— 14. Outermost portion of a sucker with calcareous spicules, magnified.

— 15. Viscera, magnified: *a* water-vascular ring; *b, b* dorsal stems with dichotomous division; *c, c, c* the three branches of the lateral vessel; *d* sand-canal; *e* eferent duct of generative organ; *f* generative organ with its ramifications; *g* œsophagus; *h* vesicle of Poli.

— 16. Extremity of sand-canal in *Elpidia glacialis*, Théel: *a* calcareous reticulations, partially surrounding the terminal attachment; magnified.

— 16[1]. The said reticulations highly magnified.

fig. 17 & 18. Otoliths, magnified: *a* outermost layer; *b* roundish prominence.

— 19 & 20. Calcareous figures of different form in the skin of the oral disk.

fig. 21. Calcareous network in skin of oral disk, magnified.

— 22. Spicular reticulations in the skin, magnified.

— 23. Calcareous spicules, of different form, in the skin; magnified.

— 24. Branching calcareous spicules, magnified.

— 25. Mucous cells, magnified: *a* lunate incision.

Pl. III, fig. 26. Diagram of the inner ventral surface of the skin and part of the nervous system: *a, a* transverse muscles; *b* pedal ampulla; *c, c* auditory vesicles; *d* radial nerve; *e* longitudinal muscle with radial nerve; *f, f* muscular bands from pedal ampulla; *g* part of the nervous ring; *h, h* suckers.

Tab. III, Fig. 27. Kalkringen, forstørret. *a, a* Kalkstavenes Tilnærmelse.

— 28. Et af Kalkringens 5 Stykker, forstørret. *a* Midtparti: *b, b* to af de forreste Kalkstave; *c, c* de fire øvrige forreste Kalkstave, der hver deler sig i 2 Grene; *d, d, d, d* de fire lange, bagerste Stave.

— 28[1]. En af Kalkringens Stave, stærkt forstørret.

— 29. Generationsorganets Udførselsgang og Stenkanalen, tilligemed et Stykke Hud, forstørrede. *a* Stenkanalen; *b* dens frie Aabning paa Ryggen; *c* Spikler, som omgive Aabningen; *d* Huden, der perforeres af Udførselsgangen for Kjønsorganet; *e* Papillen med dens Aabning for Udførselsgangen; *f* Spikler omkring Aabningen; *g* Bindevævslag imellem Udførselsgangen og Stenkanalen; *h, h* Bindevævshuden, der danner Kjønssinus.

— 30. Nerveringen med de fra samme udgaaende Grene, forstørret. *a, a, a, a* Grene til Mundskiven, Svælg og Tentakler; *b, b, b, b, b* de 5 Radialstammer; *c* Radialnervens Udspring; *d, e, f* de to Radial-Rygnerver med flere Grene, hvoraf to til de store Høreblærer, der ligge en paa hver Side af Nerven; *g, g* Side-Radialnerven med dens første Høreblære.

— 31. Et Stykke af en Rygradialnerve af *Kolga hyalina* med Forgreninger, forstørret.

— 32. Nerveforgreninger i Huden, forstørrede.

— 33. Et Stykke Hud, seet fra den indre Flade med Tvermuskler, et Stykke af Længdemuskelen, samt en Stump af Side-Radialnerven og 3 Høreblærer, forstørrede. *a, a* Høreblærer.

— 34. En Høreblære, forstørret. *a* Kapselen; *b* Epithelet, som beklæder dens indvendige Flade; *c* Otolither.

Tab. IV, Fig. 1. *Irpa abyssicola,* seet fra Bugsiden, forstørret (den naturlige Størrelse er angivet ved Siden). *a* Analaabning.

— 2. Den samme, seet fra Rygsiden. *a* Anus; *b* Aabning for Kjønsorganerne.

— 3. Den samme, aabnet fra Bugsiden. *a* Længdemuskel paa Rygsiden; *b* Svælget; *c* Maven; *d* 1ste Tarmslynge; *e* 2den do.; *f* Bindevævstraad imellem Tarmen og Maven; *g* 3die Tarmslynge; *h* Rectum; *i* Udvidning af samme; *k* Vandkarringen omkring Svælget; *l* Den Poliske Blære; *m* Mavens Bugkar; *n* Tarmens do.; *o*

Pl. III, fig. 27. Calcareous ring, magnified: *a, a* approximation of the calcareous rods.

— 28. One of the five segments of the calcareous ring, magnified: *a* central portion: *b, b* two of the anterior calcareous staves (6); *c, c* the four remaining staves, each of which divides dichotomously; *d, d, d, d* the four long posterior rods.

— 28[1]. A rod of the calcareous ring, highly magnified.

— 29. Eferent duct of generative organ and the sand-canal, along with a fragment of the skin; magnified: *a* sand-canal: *b* its free opening on the back; *c* spicules surrounding the opening; *d* the skin pierced by the eferent duct of the generative organ; *e* papilla through which eferent duct opens; *f* spicules round the opening; *g* layer of connective tissue between eferent duct and sand-canal; *h, h* membrane of connective tissue forming the genital sinus.

— 30. Nervous ring with branches, magnified: *a, a, a, a* branches passing to oral disk, œsophagus, and tentacles; *b, b, b, b, b* the 5 radial stems; *c* origin of radial nerve; *d, e, f* the two radial dorsal nerves with several branches, two of which proceed to the great auditory vesicles, placed one on either side of the nerve; *g, g* lateral radial nerve with its first auditory vesicle.

— 31. Part of a dorsal radial nerve of *Kolga hyalina,* with ramifications; magnified.

— 32. Nervous ramifications in the skin, magnified.

— 33. A piece of the skin as it appears on the inner surface, with transverse muscles; part of the longitudinal muscle, a fragment of the lateral radial nerve, and 3 auditory vesicles; magnified: *a, a* auditory vesicles.

— 34. An auditory vesicle, magnified: *a* capsule; *b* epithelium covering its inner surface; *c* otoliths.

Pl. IV, fig. 1. *Irpa abyssicola,* ventral aspect (the natural size is given at side of figure): *a* anal opening.

— 2. Same animal, dorsal aspect: *a* anus; *b* opening for generative organs.

— 3. Same animal, opened ventrally: *a* longitudinal muscle on dorsal surface; *b* œsophagus; *c* ventricle; *d* 1st convolution of intestine; *e* 2nd do.; *f* filament of connective tissue between intestine and ventricle; *g* 3rd convolution of the intestine; *h* rectum; *i* expansion of do.; *k* water-vascular ring encircling œsophagus; *l* vesicle of Poli; *m* ven-

Kjønsorganernes største Stamme; *p* Enden af et Rør, der deler sig i to.

Tab. IV, Fig. 4. Et Stykke af Huden, hvori sees Kalklegemer, forstørret.

— 4 a. Mundskiven med dens Tentakler.

— 5. De hesteskodannede Kalklegemer med deres Knop paa Midten og Takker paa Enderne, forstørrede.

— 6. Forskjelligtformede Kalkspikler i Kroppens Hud, forstørrede.

— 7. En krummet Spikel med Takker og bøiede Ender, forstørret.

— 8. Et forgrenet Kalklegeme, forstørret.

— 9. Skiveformige, elliptiske Kalklegemer, forstørrede.

— 10. Spikler i Fødderne, forstørrede.

— 11. Spikler i Tentaklerne, forstørrede.

— 12. Fodenden med Spikelbeklædningen, forstørret.

— 13. En Tentakel, seet fra Adoralsiden, forstørret. *a* Skaftet; *b, b* en Lap (Forlængelse) paa Tentakelens brede, bladformige Del; *c, c* Indskjæringer, der dele Forlængelsen i tre Flige; *d* en midterste Flig. Saavel i Forlængelserne som i Fligerne sees Spikelbeklædningen.

— 14. Et af Kalkringens 5 Stykker, forstørret. *a* Midtpartiet; *b* de 4 forreste krumme Stave, der udgaa fra Midtpartiet; *c* de to bagerste horizontaltløbende Stave; *d* de to bagerste skjævt løbende Stave.

Tab. V, Fig. 1. *Myriotrochus Rinkii* i naturlig Størrelse.

— 2. Tversnit af dens Hud, forstørret. *a* Cuticula; *b* Epithel; *c* Hyalint Bindevæv; *d* Bindevævslegemer med to Udløbere; *e* Bindevævslegemer med tre Udløbere; *f* Kalkhjul; *g* Hjulets Centrum med den takkede Knop; *h* Tænder paa Hjulperipherien; *i* Indsnittet paa Tandens Basis.

— 3. Fritstaaende Legemer i den øverste Del af Kropshulheden, svarende til de hos Synaptiderne, beskrevne af Grube m. Fl., forstørrede.

— 4. Stenkanalen. *a* Et Stykke af Vandkarringen, hvori Stenkanalen udmunder, forstørret.

— 5. Tversnit af Huden hos *Myriotrochus brevis,* paa hvilket sees Cuticula, Epithellaget og *a* det hyaline Bindevævslag med forgrenede Bindevævsceller; *b, b* det fibrillære Bindevævslag; *c, c* hyalint Bindevævslag med indleirede forgrenede Bindevævslegemer; *d* Muskel; *e* Kalkhjul, forstørrede.

tral vessel of stomach; *n* do. of intestine; *o* principal stem of generative organs; *p* extremity of a tube that divides dichotomously.

Pl. IV, fig. 4. A piece of the skin, in which are seen calcareous corpuscles; magnified.

— 4 a. Oral disk with its tentacles.

— 5. Horseshoe-shaped calcareous corpuscles with a knob in the middle and dentelli at the extremities, magnified.

— 6. Calcareous spicules, of different form, in the skin of the body, magnified.

— 7. A curved spicule, with dentelli and bent extremities, magnified.

— 8. Branched calcareous corpuscle, magnified.

— 9. Discoido-elliptic calcareous corpuscles, magnified.

— 10. Spicules in suckers, magnified.

— 11. Spicules in tentacles, magnified.

— 12. Extremity of sucker, with spicular covering, magnified.

— 13. A tentacle, adoral aspect: *a* shaft; *b, b* lobe (prolation) on the broad, leaf-shaped part of the tentacle; *c, c* incisions dividing the prolation into three lobules; *d* a medial lobule. — The spicular covering is obvious alike in the prolations and the lobules.

— 14. One of the 5 segments of the calcareous ring, magnified: *a* medial portion; *b* the 4 anterior curved rods proceeding from the medial portion; *c* the two posterior horizontal rods; *d* the two posterior oblique rods.

Pl. V, fig. 1. *Myriotrochus Rinkii,* natural size.

— 2. Transverse section of the skin, magnified: *a* cuticle; *b* epithelium; *c* hyaline connective tissue; *d* corpuscles of connective tissue, each with two offshoots; *e* corpuscles of connective tissue with three offshoots; *f* calcareous wheels; *g* centre of wheel with the dentate knob; *h* teeth on circumference of wheel; *i* incision on base of tooth.

— 3. Free corpuscles in upper part of perivisceral cavity, corresponding to those in the *Synaptidæ,* described by Grube and other zoologists; magnified.

— 4. The sand-canal: *a* segment of water-vascular ring through which the sand-canal disembogues, magnified.

— 5. Transverse section of the skin in *Myriotrochus brevis,* showing cuticle, epithelial layer, and *(a)* the hyaline layer of connective tissue with ramous cells of do.; *b, b* fibrillous layer of connective tissue; *c, c* hyaline layer of connective tissue with embedded ramous corpuscles of connective tissue; *d* a muscle; *e* calcareous wheels, magnified.

Tab. V, Fig. 6. Kalkringen med Vandkarsystemet, og et Hudparti, forstørret. *a* Kalkring; *b, b* de to Processer paa de to dorsale Radialstykker; *c* den Poliske Blære; *d* Vandkarringen; *e* Længdemuskel.

— 7. Stenkanalen af samme Dyr, forstørret. *a* Ligamentet, der fæster Stenkanalens ydre Ende til Huden; *b* Madreporpladen med sin ujevne, takkede Overflade; *c* den egentlige Kanal; *d* den bredere Del, hvorved den udmunder i Vandkarringen.

— 9. Tversnit af Huden af den bagerste Ende af *Acanthotrochus mirabilis*, forstørret. *a* Cuticula med det derunder liggende Epithellag; *b* Hyalint Bindevæv; *c, c* Bindevævslegemer; *d* Bindevævslegemer med kornet Indhold (Sempers Slimceller); *e, e* Encellede Slimkjertler; *f* Ringmuskler; *l* Længdemuskel; *g* Nervekarret sammenvoxet til Nervens indre Flade; *h* Nervekarret, der er aabent til Nervens ydre Flade; *i* Nervestammens lysere, bredere Lag; *k* Nervestammens mørkere Parti, der er sammenvoxet med Karret.

Tab. VI. Fig. 8. *Acanthotrochus mirabilis* i omtrent naturlig Størrelse.

— 8^{1}. Den samme forstørret, i hvis gjennemsigtige Hud Kalkhjulene sees, ligesom Tarmkanalen viser sig tydeligt.

— 10. Stilkløse Legemer, der rage frit i Kropshulheden; *a, a* Spredte Epithelceller i Peritonealovertrækket, forstørrede.

— 11. Lignende Legemer, men stilkede og bladformige, forstørrede.

— 12. Et Stykke Hud, hvori de forskjellige Hjul ere leirede, forstørret. *a, a* De store Hjuls Tænder.

— 13. Det store Hjul, stærkere forstørret. *a, a* Vingeformige Radier; *b* trekantet Rum imellem to Radier; *c* Tand paa Hjulets ydre Rand.

— 14. Det mindre Hjul, stærkt forstørret. *a* Vingeformige Radier; *b* Mellemrummet for to Radier; *c* Tænder paa Hjulets indre Rand.

— 15. Kalkringen, seet fraoven, forstørret. *a* Længdefure; *b, b* de to Processer paa to Radialstykker; *c* en Proces paa hvert af de øvrige tre Radialstykker; *d* Interradialstykket paa Ryggens Midte; *e* Halvmaaneformigt Indsnit.

— 16. Et Stykke af Kalkringen, seet fra Siden, lidt stærkere forstørret. *a* Radialstykkets Legeme; *b* dets Proces; *c* Længdefure;

Pl. V, fig. 6. Calcareous ring, aquiferous system, and part of the skin, magnified: *a* calcareous ring; *b, b* the two processes on the two dorsal radial segments; *c* vesicle of Poli; *d* water-vascular ring; *e* longitudinal muscle.

— 7. Sand-canal in same animal, magnified: *a* the ligament by which the outer extremity of the sand-canal is attached to the skin; *b* madreporic body with its rough indented surface; *c* sand-canal; *d* the broad part through which it opens into the water-vascular ring.

— 9. Transverse section of the skin of the posterior extremity of *Acanthotrochus mirabilis*, magnified: *a* cuticle with underlying epithelial layer; *b* hyaline connective tissue; *c, c* corpuscles of connective tissue; *d* corpuscles of connective tissue with granulous contents (Semper's mucous cells); *e, e* unicellular mucous glands; *f* annular muscles; *l* longitudinal muscle; *g* nervous vessel connate with inner surface of nerve; *h* nervous vessel open towards outer surface of nerve; *i* the broad, light-coloured layer of the nervous stem; *k* the darker section of the nervous stem, connate with the vessel.

Pl. VI. fig. 8. *Acanthotrochus mirabilis*, about the natural size.

— 8^{1}. Same animal magnified, showing the calcareous wheels through the translucent skin; the intestinal canal, too, is distinctly perceptible.

— 10. Non-pedicellate corpuscles projecting freely into the perivisceral cavity: *a, a* isolated epithelial cells in the peritoneal tunic.

— 11. Similar corpuscles, but pedicellate and leaf-shaped; magnified.

— 12. A piece of the skin in which the calcareous wheels are embedded, magnified: *a, a* teeth of the large wheels.

— 13. One of the large wheels more highly magnified: *a, a* wing-shaped radii; *b* triangular space between two of the radii; *c* teeth on outer margin of wheel.

— 14. One of the small wheels highly magnified: *a* wing-shaped radii; *b* space between two of the radii; *c* teeth on inner margin of wheel.

— 15. The calcareous ring, viewed from above, magnified: *a* longitudinal furrow; *b, b* the two processes on the two radial segments; *c* process on each of the three remaining radial segments; *d* the interradial segment on the middle of the back; *e* lunate incision.

— 16. Segment of the calcareous ring, lateral aspect; more highly magnified: *a* corpus of radial segment; *b* its process; *c* longi-

d halvmaaneformigt Indsnit; *e, e* de smaa Fremstaaenheder paa Ringens bagerste Rand.

Tab. VI. Fig. 17. Den sækformige Stenkanal, hvori Kalk, forstørret.

— 18. Kalkfletninger i Kalksækkens Vægge, forstørrede.

— 19. En Tentakel, forstørret. *a* Skaft; *b* Blad med sine tre Lapper; *c* Indsnit i Sidelappen.

— 20. Æggestokkene, forstørrede. *a, a* Æggesække; *b* Udførselskanal; *c* Æg i forskjellige Udviklingsstadier.

Tab. VII. Fig. 1. *Trochostoma Thomsonii* i naturlig Størrelse. *a* Analtænderne; *b* Mundaabning; *c* rørformige Forlængelser paa Skiven; *d* aflange Fordybninger; *e* Rummet imellem 2 Længdemuskler.

— 2. Mundskiven, forstørret. *a* Mundskivens glatte, hvælvede Del; *b* den dybe Linie imellem Mundskivens indre og ydre Del; *c* rørformig Forlængelse; *d* aflang Fordybning; *e, e* Tentakler.

— 3. *Trochostoma Thomsonii,* aabnet fra Bugen, naturlig Størrelse. *a* Tvermuskler; *b* Længdemuskler; *c* knæformig Bøining af Tarmen; *d* Rectum; *e, f* det venstre Tarmappendix; *g* det høire do.; *h* Poli's Blære; *i* Tarmkar.

— 4. En Tentakel, forstørret.

— 5. Et Stykke af Kalkringen, seet fra Siden, lidt forstørret. *a, a* Radialstykkernes forlængede Del; *b, b* Radialstykkernes Legeme; *c* Kamme paa Radialstykkets udvendige Flade; *d, d* skeformige Gruber, hvori Længdemusklerne fæste sig; *e* Fure for Tentakelampullen.

— 6. Et Radialstykke, forstørret. *a* den forlængede Del; *b* Legemet; *c* halvmaaneformigt Indsnit; *d* Furen for Ampullen.

— 7. Et Interradialstykke, forstørret. *a* det triangulære Spatium; *b* Furen for Tentakelampullen; *c* halvmaaneformigt Indsnit.

— 8. Enkelte indre Dele af *Trochostoma Thomsonii,* forstørrede. *a* den skeformige Grube paa Radialstykket, hvori Længdemuskelen fæster sig; *b* Bindevævet, som befæster Vandkarringen til Radialstykkets forlængede Del; *c* Maven; *d* Pylorus; *e* Vandkarringen; *f* en af de 5 Vandkanaler; *g* Længdekanal; *h* Tentakelampulle; *i* Blodkarnet.

— 9. En Muskeltraad med sit Bindevæv, der binder Tarmen til Tvermusklerne. I

tudinal furrow; *d* lunate incision; *e, e* the small projections on the posterior margin of the ring.

Pl. VI. fig. 17. The sac-like sand-canal, containing calcareous deposit; magnified.

— 18. Calcareous reticulations in the walls of the calcareous sac, magnified.

19. A tentacle, magnified: *a* shaft; *b* leaf-like expansion with its three lobules; *c* incision in lateral lobule.

— 20. Ovaries, magnified: *a, a* ovarian pouches; *b* eferent duct; *c* ova in different stages of development.

Pl. VII. fig. 1. *Trochostoma Thomsonii,* natural size: *a* anal teeth; *b* buccal opening; *c* tubular prolations on the disk; *d* oblong depressions; *e* space between two of the longitudinal muscles.

— 2. Oral disk, magnified: *a* the smooth arcuate portion of oral disk; *b* deep groove between the inner and outer parts of the oral disk; *c* tubular prolation; *d* oblong depression; *e, e* tentacles.

— 3. *Trochostoma Thomsonii,* opened ventrally, natural size: *a* transverse muscles; *b* longitudinal muscles; *c* knee-shaped flexion of the intestine; *d* rectum; *e, f* left intestinal appendix; *g* right intestinal appendix; *h* vesicle of Poli; *i* intestinal vessels.

— 4. A tentacle, magnified.

— 5. Part of the calcareous ring, lateral aspect; slightly magnified: *a, a* prolonged portion of radial segments; *b, b* corpus of radial segments; *c* combs on outer surface of each radial segment; *d, d* spoon-shaped cavities in which the longitudinal muscles are inserted; *e* furrow for tentacular ampulla.

— 6. A radial segment, magnified: *a* prolonged portion; *b* corpus; *c* lunate incision; *d* furrow for the ampulla.

— 7. An interradial segment, magnified: *a* the triangular space; *b* furrow for the tentacular ampulla; *c* lunate incision.

— 8. Various inner parts of *Trochostoma Thomsonii,* magnified: *a* spoon-shaped cavity on radial segment in which a longitudinal muscle is inserted; *b* connective tissue webbing water-vascular ring to the prolonged portion of the radial segment; *c* stomach; *d* pylorus; *e* water-vascular ring; *f* one of the five ambulacral canals; *g* longitudinal canal; *h* tentacular ampulla; *i* network of blood-vessels.

— 9. A muscular filament with connective tissue, webbing the intestine to the trans-

Bindevævet sees forskjelligformede Kalklegemer.

Tab. VII, Fig. 10. En Unge af *Trochostoma Thomsonii,* aabnet fra Ryggen, forstørret. *a* den tragtformige Forlængelse af Tarmen; *b* det høire Tarmappendix; *c* dets Befæstning paa Kalkringen; *d* det venstre Tarmappendix.

— 11. Et noget yngre Individ, aabnet fra Ryggen og Tarmen lagt til Side, forstørret. *a* den tragtformige Udvidning af Rectum; *b* høire Tarmappendix; *c* Blære paa samme; *d* det venstre Tarmappendix.

Tab. VIII. Fig. 12. Tversnit af Huden paa det Sted, hvor en Længdekanal og en Radialnerve løbe imellem to Længdemuskler, forstørret. *a* Nervestamme; *b, b* Sidegrene; *c* Længdekanal; *d, d* Længdemuskler; *e* Kalklegemer.

— 13. *a, b, c* Hudnerver med ganglionære Udvidninger og Forgreninger.

— 14. Stenkanalen med Madreporpladen, seet fra Siden, forstørret. *a* Bindevævslag; *b* den afrundede Ende; *c* Madreporpladen; *d* Kanalen.

— 15. Stenkanalen med Madreporpladen, seet fraoven, forstørret. *a* Kanalen; *b* den afrundede Ende; *c* Madreporpladen.

— 15[1]. En Del af Stenkanalen med dens Kalkringe, forstørret.

— 16. Et Stykke Hud af Kroppens midterste Del, hvori sees Kalklegemer, forstørret. *a* runde, kjerneholdige Kalklegemer; *b* straalede Kalklegemer; *c* gjennembrudte Kalkplader med Krone.

— 17. Et Stykke Hud af Kroppens forreste Ende, hvori Kalklegemer, forstørret. *a* en aflang Kalkplade med sin Krone.

— 18. Et Stykke Bindevæv af Kroppens indre Beklædning, hvori sees runde, straalede Kalklegemer, forstørret.

— 19. Tversnit af Huden, forstørret. *a* Cuticula; *b* Epithel; *c* ydre Bindevævslag; *d* indre Bindevævslag; *e, e* Kalklegemer.

Fig. 20—23. Forskjelligformede Kalklegemer i Huden paa Kroppens forreste og bagerste Ende, forstørrede.

Fig. 24, 26—34. Forskjelligformede Kalklegemer i Kroppens Hud, forstørrede.

verse muscles. In the connective tissue are seen calcareous corpuscles of different form.

Pl. VII. fig. 10. A young specimen of *Trochostoma Thomsonii,* opened dorsally, magnified: *a* funnel-shaped prolation of intestine; *b* right intestinal appendix; *c* its attachment on the calcareous ring; *d* left intestinal appendix.

— 11. A somewhat younger example, opened dorsally, with the intestine moved aside; magnified: *a* funnel-shaped expansion of rectum; *b* right intestinal appendix; *c* vesicles on do.; *d* left intestinal appendix.

Pl. VIII, fig. 12. Transverse section of the skin, where a longitudinal canal and a radial nerve pass between two longitudinal muscles, magnified: *a* nervous stem; *b, b* lateral branches; *c* longitudinal canal; *d, d* longitudinal muscles; *e* calcareous corpuscles.

— 13. *a, b, c* nerves in the skin, with ramifications and ganglionic expansions.

— 14. Sand canal with madreporic body, lateral aspect, magnified: *a* layer of connective tissue; *b* rounded extremity; *c* madreporic body; *d* the canal.

— 15. Sand canal with madreporic body, viewed from above, magnified: *a* the canal; *b* its rounded extremity; *c* madreporic body.

— 15[1]. Part of the sand-canal with its calcareous rings, magnified.

— 16. A piece of skin from the medial part of the body, in which are seen calcareous corpuscles, magnified: *a* round, nucleal calcareous corpuscles; *b* radiating calcareous corpuscles; *c* perforated calcareous plates with a corolla.

— 17. A piece of skin from the anterior extremity of the body, in which are seen calcareous corpuscles, magnified: *a* oblong calcareous plate with its corolla.

— 18. Strip of connective tissue from the inner covering of the body, throughout which are dispersed around, radiating calcareous corpuscles, magnified.

— 19. Transverse section of the skin, magnified: *a* cuticle; *b* epithelium; *c* outer layer of connective tissue; *d* inner layer of connective tissue; *e, e* calcareous corpuscles.

figs. 20—23. Calcareous corpuscles, of different form, in the skin, at the anterior and posterior extremities of the body; magnified.

figs. 24, 26—34. Calcareous corpuscles, of different form, in the skin of the body; magnified.

Tab. VIII. Fig. 25. En Kalkplade, der viser Armenes Deling. *a* en Arm: *b* Armens Deling, forstørret.

— 35. Celler og Krystaller i Vandkarfluidet, forstørrede. *a, a* Celler, hvori indesluttet Kalkkrystaller: *b* frie vinrøde Krystaller.

— 36. Forgrenet Bindevævslegeme, forstørret.

— 37. Klare kornholdige Celler (Sempers Slimceller), forstørrede.

Tab. IX. Fig. 38. De brune kolbeformige Legemer i Tarmappendices, forstørrede.

— 39. Hannens Kjønsorgan.

— 40. Hunnens do.

— 41. Æg i forskjellige Udviklingsstadier.

— 1. *Trochostoma arcticum,* naturlig Størrelse. *a* Mundskivens glatte, hvælvede Del.

— 2. Mundskiven med de i de aflange Fordybninger indtrukne Tentakler, samt de rørformige Forlængelser, forstørrede. *a* Mundskiven; *b* de rørformige Forlængelser; *c* de aflange Gruber, hvori sees Tentaklerne.

— 3. En Tentakel, forstørret. *a* Midtfligen.

— 4. *Trochostoma arcticum* i naturlig Størrelse, aabnet efter Bugen. *a* Tvermuskler; *b* Længdemuskler; *c* Kalkring; *d* Vandkarring; *e* Poli's Blære; *f* Generationsorganer; *g* Spiserør og Mave; *h* 1ste nedstigende Tarmdel med Bugkarret og dets Anastomoser; *i* den fortil gaaende Tarmdel med Bugkarret og Mesenteriet; *k* den af Ler stærkt udvidede Rectum; *l* Kloaken med de derfra udgaaende Tarmappendices.

— 5. Hud, hvori gjennemborede Kalkplader med Krone, forstørret.

Tab. X. Fig. 6. Tversnit af Huden hos *Trochostoma arcticum,* forstørret. *a* Cuticula; *b* Epithel; *c* fibrillært Bindevæv med Bindevævslegemer; *d* Kalkplade med Krone; *e* Radialnerven; *f* Radialkar med Sidegrene.

— 7. Tversnit af Huden af *Trochostoma boreale,* forstørret. *a* elliptiske, vinrøde Kalklegemer; *b* Kalkplader med delte Kroner, som ere forsynede med Takker paa den fri Ende; *c* Epithellaget; *d* fibrillært Bindevæv; *e* Nerven; *f* Radialkar.

— 8. Kalkplader med Udløbere og Kroner fra Dyrets Ender, forstørrede.

— 9. Forskjelligformede gjennembrudte Kalk-

Pl. VIII, fig. 25. A calcareous plate showing the division of the arms: *a* an arm; *b* division of arm; magnified.

— 35. Cells and crystals in the aquiferous fluid, magnified: *a, a* cells containing calcareous crystals; *b* free crystals of a vinous red.

— 36. Ramous corpuscles of connective tissue, magnified.

— 37. Pellucid cells with granulary contents (Semper's mucous cells), magnified.

Pl. IX, fig. 38. The brown clavate corpuscles in the intestinal appendices, magnified.

— 39. Generative organ in male.

— 40. Generative organ in female.

— 41. Ova in various stages of development.

— 1. *Trochostoma arcticum,* natural size: *a* smooth, arcuate portion of oral disk.

— 2. Oral disk with tentacles retracted into the oblong cavities, and the tubular prolations; magnified: *a* oral disk; *b* tubular prolations; *c* oblong cavities, in which are seen the retracted tentacles.

— 3. A tentacle, magnified: *a* medial lobe.

— 4. *Trochostoma arcticum,* natural size, opened ventrally: *a* transverse muscles; *b* longitudinal muscles; *c* calcareous ring; *d* water-vascular ring; *e* vesicle of Poli; *f* generative organs; *g* œsophagus and stomach; *h* 1st descending portion of intestine with ventral vessel and its anastomosing branches; *i* anteriorly protending portion of intestine with ventral vessel and mesentery; *k* rectum much distended with clay; *l* cloacum with intestinal appendices issuing from it.

— 5. Strip of skin in which are seen perforate calcareous plates with corollæ, magnified.

Pl. X, fig. 6. Transverse section of skin in *Trochostoma arcticum,* magnified: *a* cuticle; *b* epithelium; *c* fibrillous connective tissue with corpuscles of do.; *d* calcareous plate with corolla; *e* radial nerve; *f* radial vessel with lateral branches.

— 7. Transverse section of skin in *Trochostoma boreale,* magnified: *a* elliptic calcareous corpuscles of a vinous red; *b* calcareous plates with cleft corollæ, dentate at the free extremity; *c* epithelial layer; *d* fibrillous connective tissue; *e* the nerve; *f* radial vessel.

— 8. Calcareous plates with offshoots and corollæ springing from the extremities of the body.

— 9. Perforate calcareous plates, of different

plader med Krone af *Trochostoma boreale*, forstørrede.

Tab. X, Fig. 10. De elliptiske vinrøde Kalklegemer af *Tr. boreale*, stærkt forstørrede.

— 11. Rundagtige, gule Kalklegemer af *Tr. boreale*, stærkt forstørrede.

— 12. *Ankyroderma Jeffreysii* i naturlig Størrelse.

— 13. Kroppens forreste Ende med Mundskiven, seet en face, forstørret. *a* den glatte og lidt hvælvede indre Del af Mundskiven; *b* de rørformige Forlængelser paa den ydre Del af Mundskiven; *c* Tentaklerne i de aflange Gruber; *d* Genitalpapillen.

— 14. Et Stykke af Dyrets bagerste Krop, forstørret. I Huden sees stjerneformige Legemer.

— 15. *Ankyroderma Jeffreysii*, aabnet efter Rygfladen, lidt forstørret. *a* Tvermuskler, samt de i Huden i Grupper leirede smaa, runde eller elliptiske vinrøde Legemer; *b* Længdemuskler; *c* Rectum; *d* Kloaken, fra hvis forreste Del udgaa Tarmappendices; *e* det venstre Tarmappendix; *f* det høire Tarmappendix; *g* Poli's Blære; *h* Kjønsorganet; *i* Stenkanalen med Madreporpladen.

Tab. XI, Fig. 16. Stenkanalen med Madreporpladen af *Ankyroderma Jeffreysii*, seet fraoven, forstørret. *a* Kalknet, der omgiver Kanalen; *b* Kanalen, der her deler sig i to.

— 17. Samme Figur, seet fra Undersiden.

— 18. Stenkanalen med den begyndende Madreporplade hos et yngre Individ.

— 19. Et Stykke Hud, forstørret, af et ældre Dyrs bagerste Ende, hvori sees de smaa, runde eller aflange vinrøde Kalklegemer, der danne ligesom et sammenhængende Lag, under hvilket iagttages gjennembrudte Kalkplader med Sideudløbere og Krone.

— 20. Et Stykke Hud, hvori sees de forskjellige Kalklegemer, forstørret.

— 21. 5 spatelformige Kalkstave, fra hvis Midte hæver sig et Anker, og imellem hvilke sees vinrøde, forskjelligformede Kalklegemer, forstørrede. *a* Spatelens Skaft; *b* dens Blad; *c* Ankerstokkens Basis; *d* Ankerkloen med tre Takker paa dens ydre Rand.

form, with corollæ, occurring in *Trochostoma boreale;* magnified.

Pl. X, fig. 10. The elliptic, calcareous corpuscles, of a vinous red, in *Tr. boreale*, highly magnified.

— 11. Yellow, roundish calcareous corpuscles in *Tr. boreale*, highly magnified.

— 12. *Ankyroderma Jeffreysii*, natural size.

— 13. Anterior extremity of body with oral disk, front aspect; magnified: *a* smooth and slightly arcuate inner portion of oral disk; *b* tubular prolations on outer portion of oral disk; *c* tentacles in the oblong cavities; *d* genital papilla.

— 14. Part of posterior extremity of body, magnified. In the skin are seen stellate corpuscles.

— 15. *Ankyroderma Jeffreysii*, opened dorsally; slightly magnified: *a* transverse muscles, and the small — round or elliptic — corpuscles, of a vinous red, that occur in the skin; *b* longitudinal muscles; *c* rectum; *d* cloacum with intestinal appendices protending from anterior portion; *e* left intestinal appendix; *f* right intestinal appendix; *g* vesicle of Poli; *h* generative organ; *i* sand canal with madreporic body.

Pl. XI, fig. 16. Sand canal with madreporic body in *Ankyroderma Jeffreysii*, viewed from above, magnified: *a* calcareous network surrounding the canal; *b* the canal where it divides dichotomously.

— 17. Same parts viewed from beneath.

— 18. Sand canal with incipient madreporic body in a young specimen.

— 19. Strip of skin (magnified) from posterior extremity of a mature specimen, showing the small — round or elliptic — calcareous corpuscles, of a vinous red, that constitute an almost continuous layer, under which appear perforate calcareous plates with lateral offshoots and corollæ.

— 20. A piece of the skin, in which are shown the different calcareous corpuscles, magnified.

— 21. Five spatulate calcareous rods, from the middle of which spring as many anchor-shaped prolations, and between which are seen the calcareous corpuscles of different form and vinous red in colour; magnified: *a* shaft of spatula; *b* expansion of spatula; *c* base of the anchor; *d* fluke of the anchor with three cogged teeth on outer margin.

Tab. XI, Fig. 22. En Del af Generationsorganet, forstørret.

— 23. Kloak, fra hvis øverste (forreste) Ende udgaa to Tarmappendices (Respirationsorganer), forstørret.

Tab. XII, Fig. 24. Tversnit af Huden, forstørret. *a* Cuticula; *b* Epithel; *c* fibrillært Bindevæv; *d* Muskellaget; *e* de smaa runde eller elliptiske vinrøde Kalklegemer, leirede i Grupper; *f* gjennembrudt Kalkplade med Krone; *g* Cuticula og Epithel, der beklæde Kalkpladens Krone; *h* 3 spatelformige Kalkstave, indesluttede i en Papille (Kapsel), dannet af Corium og beklædt af *i, i* Cuticula og Epithel.

— 25. En Tentakel af *Ankyroderma Jeffreysii*, forstørret.

— 26. Enkelte indre Dele af *Ankyroderma Jeffreysii*, forstørrede. *a* Kalkring; *b, b* Ampulle; *c* Poli's Blære; *d* Længdemuskler; *e* Spiserøret; *f* Tvermuskler; *g* Stenkanal med Madreporplade.

— 27. Et Stykke af Kalkringen, seet fra Siden, forstørret. *a, a* Radialstykker; *b, b* to fremragende Kamme; *c* Fordybningen paa den ene Kam, hvori Radialmuskelen fæster sig; *d* Furen imellem begge Kamme; *e* det halvrunde Indsnit imellem begge Kammes forreste Spidser; *f* Radialstykkets bagerste forlængede Del (Processus) med sin spaltede Ende; *g* Kammen paa Interradialstykket; *h* halvmaaneformigt Indsnit imellem Interradial- og Radialstykkets forreste Spids; *i* Furen paa hver Side af Interradialstykkets Kam.

— 28. Kjønsorganet hos Hunnen.

— 29. *Ankyroderma affine*, lidt forstørret. *a* De stjerneformige Kalklegemer.

— 30. *Ankyroderma affine*, aabnet efter Ryggen, naturlig Størrelse. *a* Længdemuskler; *b* venstre Tarmappendix; *c* Tentakelampulle; *d* Stenkanalen med Madreporpladen; *e* Kjønsorganet.

— 31. *a, b, c, d* Kalklegemer med Udløbere og Krone, forstørrede.

— 31 a. Et saadant Kalklegeme, stærkt forstørret.

Fig. 32 & 33. Forskjellige Kalklegemer i Huden, af hvilke flere danne gjennembrudte Plader.

Fig. 34. 5 spatelformige Kalkstave med Ankeret, forstørrede. *a* Spatelens Blad med dets mange smaa Huller; *b* Ankeret

Pl. XI, fig. 22. Part of generative organ, magnified.

— 23. Cloacum, with two intestinal appendices (respiratory organs) issuing from its upper (anterior) extremity, magnified.

Pl. XII, fig. 24. Transverse section of the skin, magnified: *a* cuticle; *b* epithelium; *c* fibrillous connective tissue; *d* muscular layer; *e* the small — round or elliptic — calcareous corpuscles, of a vinous red, embedded in groups; *f* perforate calcareous plate with corolla; *g* cuticle and epithelium investing corolla of the calcareous plate; *h* three spatulate calcareous rods enclosed in a papilla (capsule), formed by the corium and covered by the cuticle and epithelium *(i, i)*.

— 25. A tentacle of *Ankyroderma Jeffreysii*, magnified.

— 26. Various inner parts of *Ankyroderma Jeffreysii*, magnified: *a* calcareous ring; *b, b* ampulla; *c* vesicle of Poli; *d* longitudinal muscles; *e* œsophagus; *f* transverse muscles; *g* sand canal with madreporic body.

— 27. Part of the calcareous ring, lateral aspect, magnified: *a, a* radial segments; *b, b* two projecting combs; *c* depression on one of the combs in which the radial muscle is attached; *d* furrow between the two combs; *e* semicircular incision between the anterior extremities of the two combs; *f* posterior prolonged portion (process) of radial segment with cleft extremity; *g* comb on interradial segment; *h* lunate incision between the anterior extremities of the interradial and radial segments; *i* furrow on either side of the comb of an interradial segment.

— 28. Generative organ in female.

— 29. *Ankyroderma affine*, slightly magnified: *a* stellate calcareous corpuscles.

— 30. *Ankyroderma affine*, opened dorsally, natural size: *a* longitudinal muscles; *b* left intestinal appendix; *c* tentacular ampulla; *d* sand canal with madreporic body; *e* generative organ.

— 31. *a, b, c, d* calcareous corpuscles with offshoots and corollæ, magnified.

— 31 a. One of these calcareous corpuscles highly magnified.

figs. 32, 33. Calcareous corpuscles in the skin, several of which exhibit the form of perforate plates.

fig. 34. Five spatulate calcareous rods with their anchor-shaped prolations, magnified: *a* palm of the spatula with its numerous minute

med 4 Takker paa Kløernes ydre Rand.

Tab. XII, Fig. 35. Kalklegemer fra det dybere Lag af Corium, bestaaende af et Agglomerat af Kalkprismer, stærkt forstørrede.

— 36. Lignende mindre og straalede Kalklegemer, forstørrede.

Tab. XIII, Fig. 1. *Myriotrochus Rinkii*, Steenstr.

— 2. *Ocnus (Cucumaria) minutus*, Fabricius.

— 3. *Trochostoma arcticum*, Marenz.

— 4. — *Thomsonii*, Dan. & Koren.

— 5. — *Thomsonii*, var. maculatum, Dan. & Koren.

— 6. Et Stykke af dennes bagerste Ende, forstørret.

Alle tegnede i levende Live.

apertures; *b* anchor-shaped prolation with 4 cogged teeth on the outer margin of the fluke.

Pl. XII, fig. 35. Calcareous corpuscles from the under layer of the corium, consisting of an agglomerate assemblage of calcareous prisms, highly magnified.

— 36. Similar, but smaller and radiating calcareous corpuscles, magnified.

Pl. XIII, fig. 1. *Myriotrochus Rinkii*, Steenstr.

— 2. *Ocnus (Cucumaria) minutus*, Fabricius.

— 3. *Trochostoma arcticum*, Marenz.

— 4. — *Thomsonii*, Dan. & Koren.

— 5. — *Thomsonii*, var. maculatum, Dan. & Koren.

— 6. Part of the posterior extremity of *Tr. Thomsonii*, var., magnified.

The representations in Pl. XIII are all from living Specimens.

Indhold.

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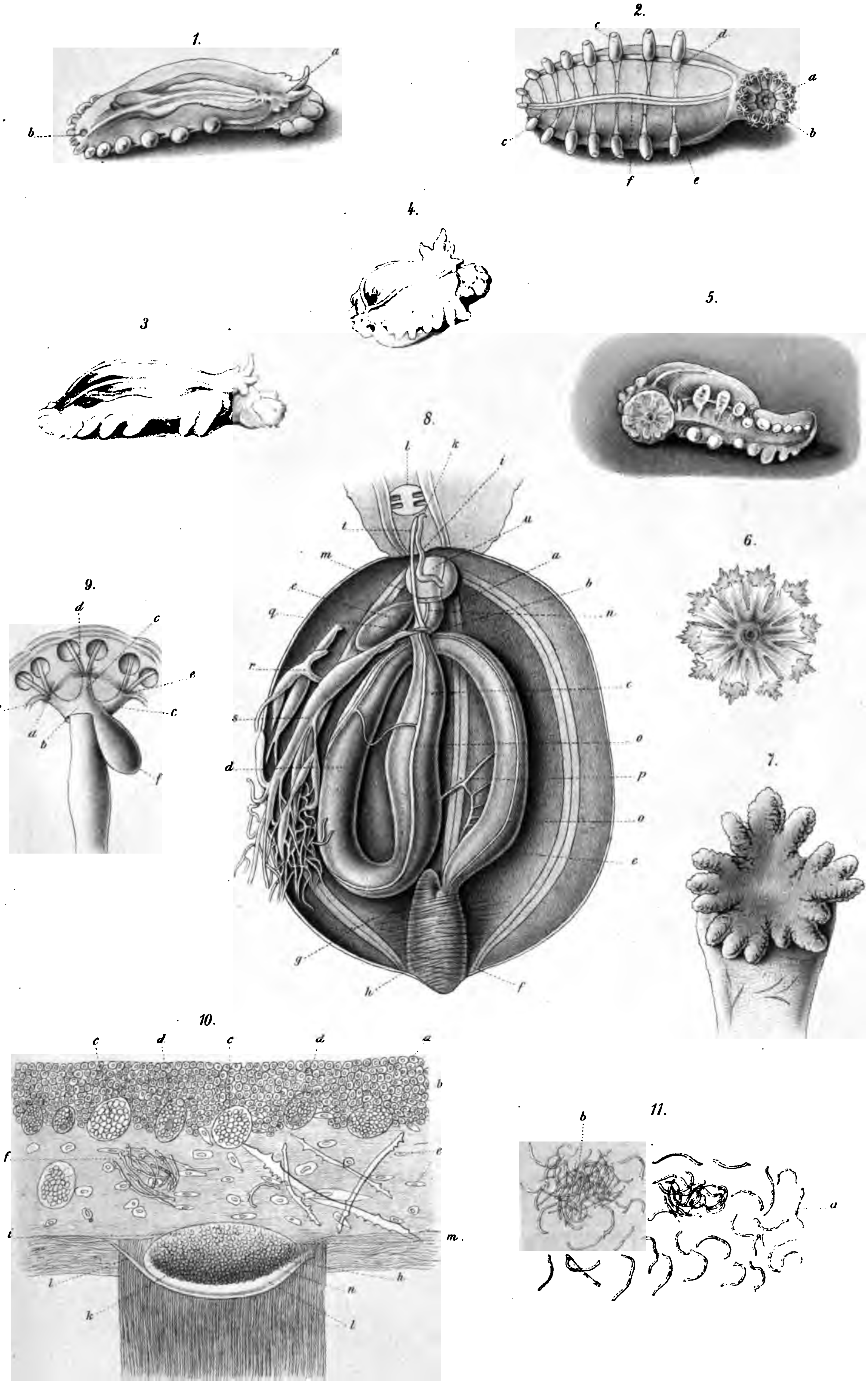
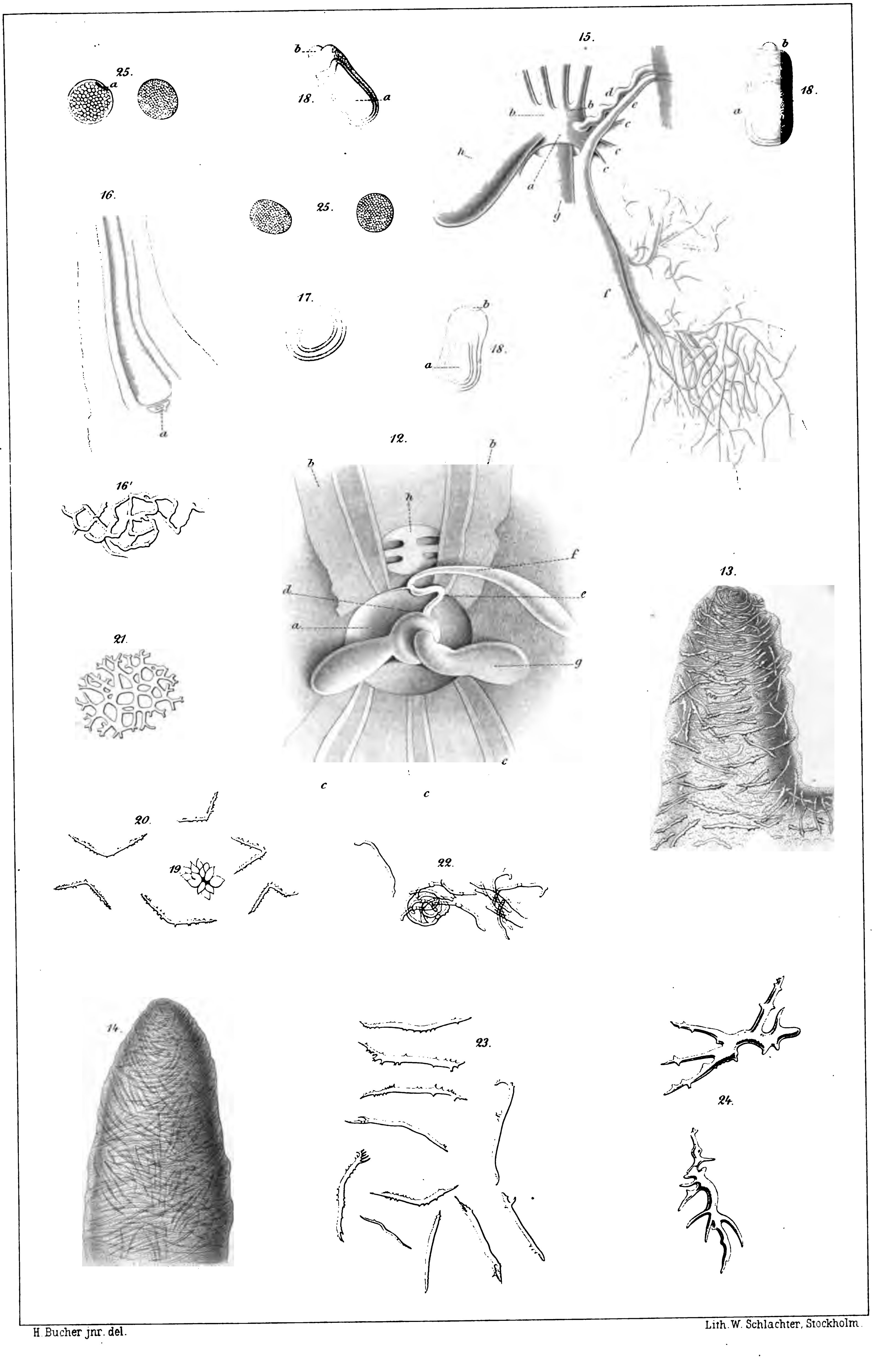


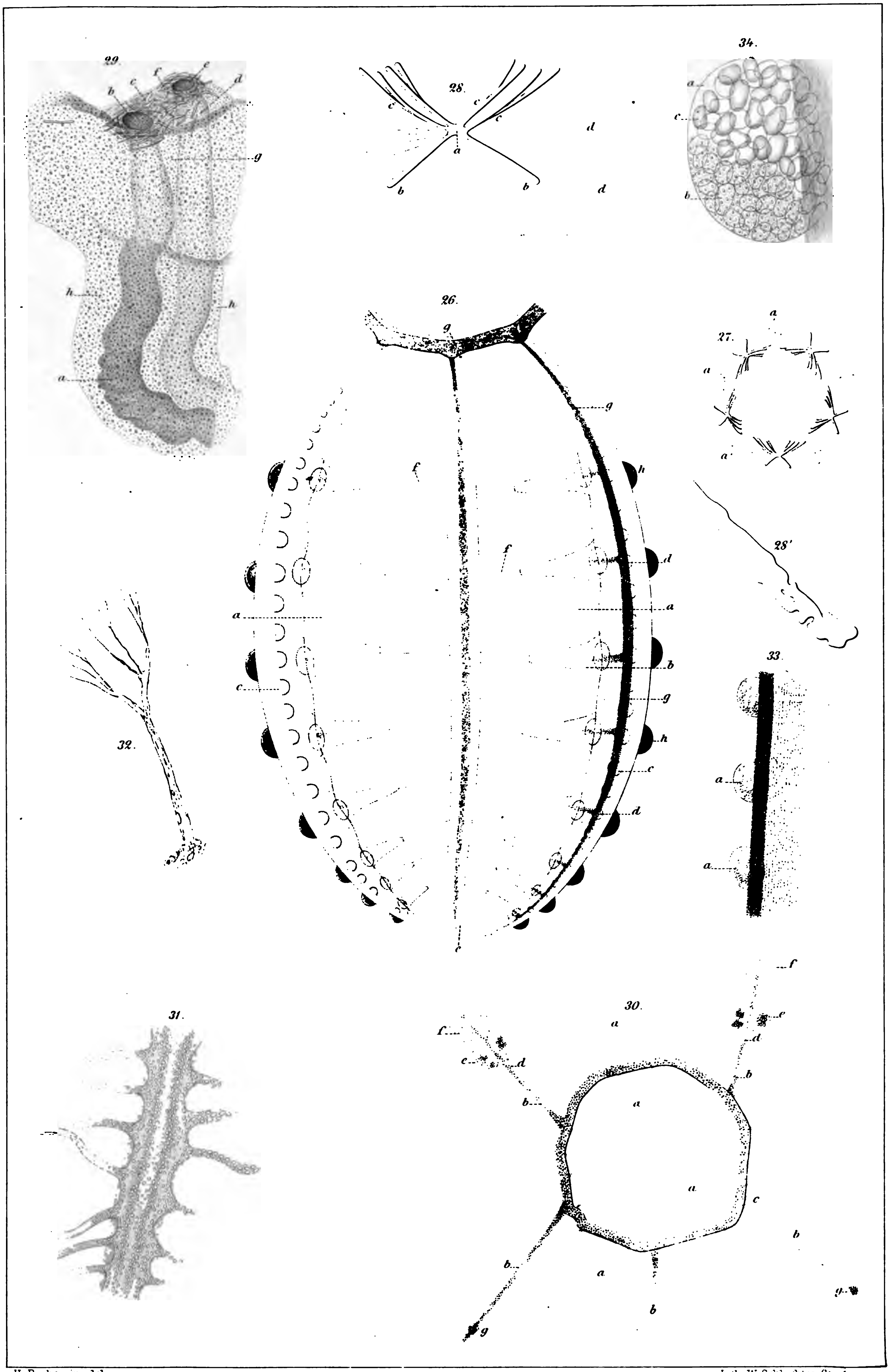
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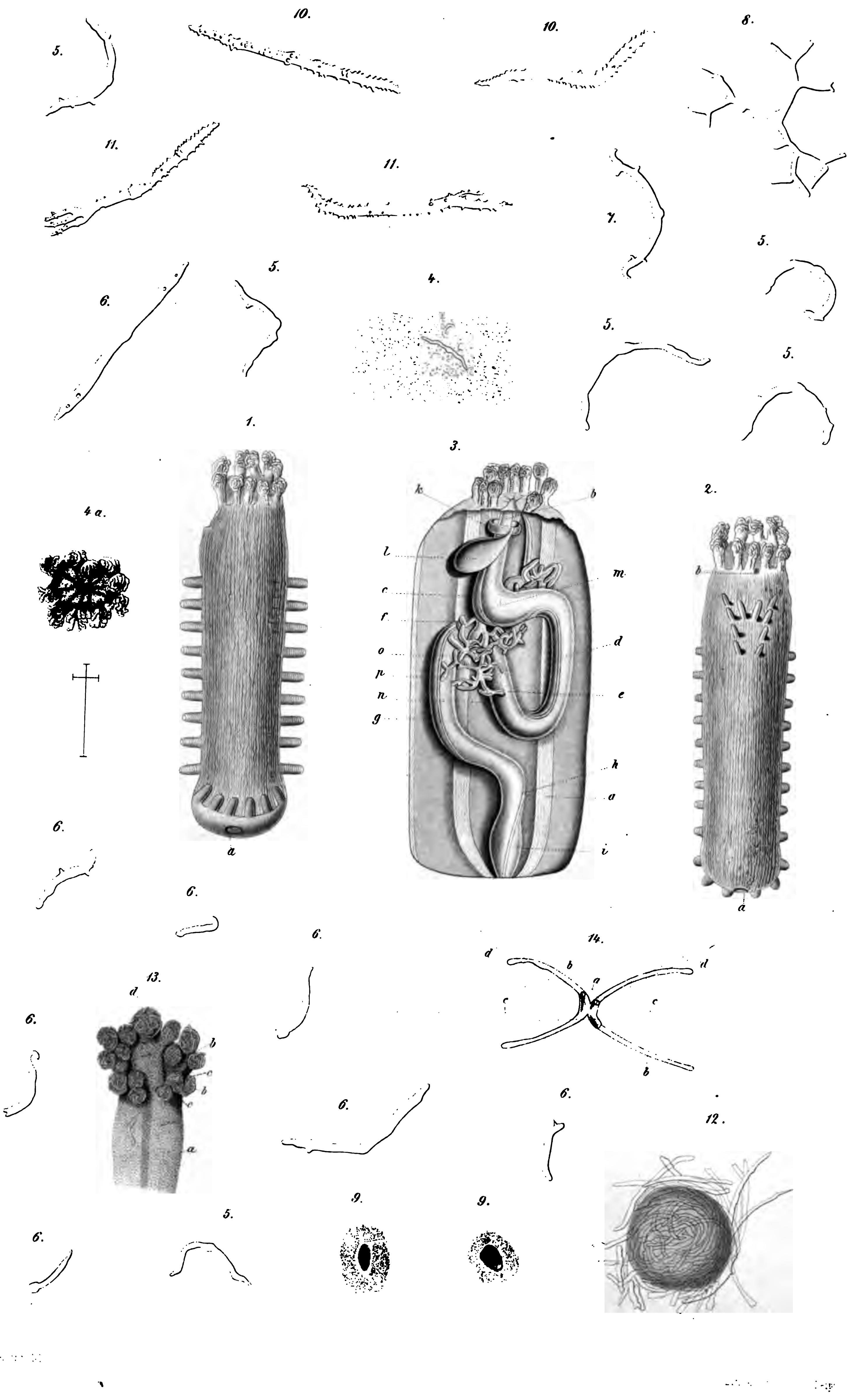
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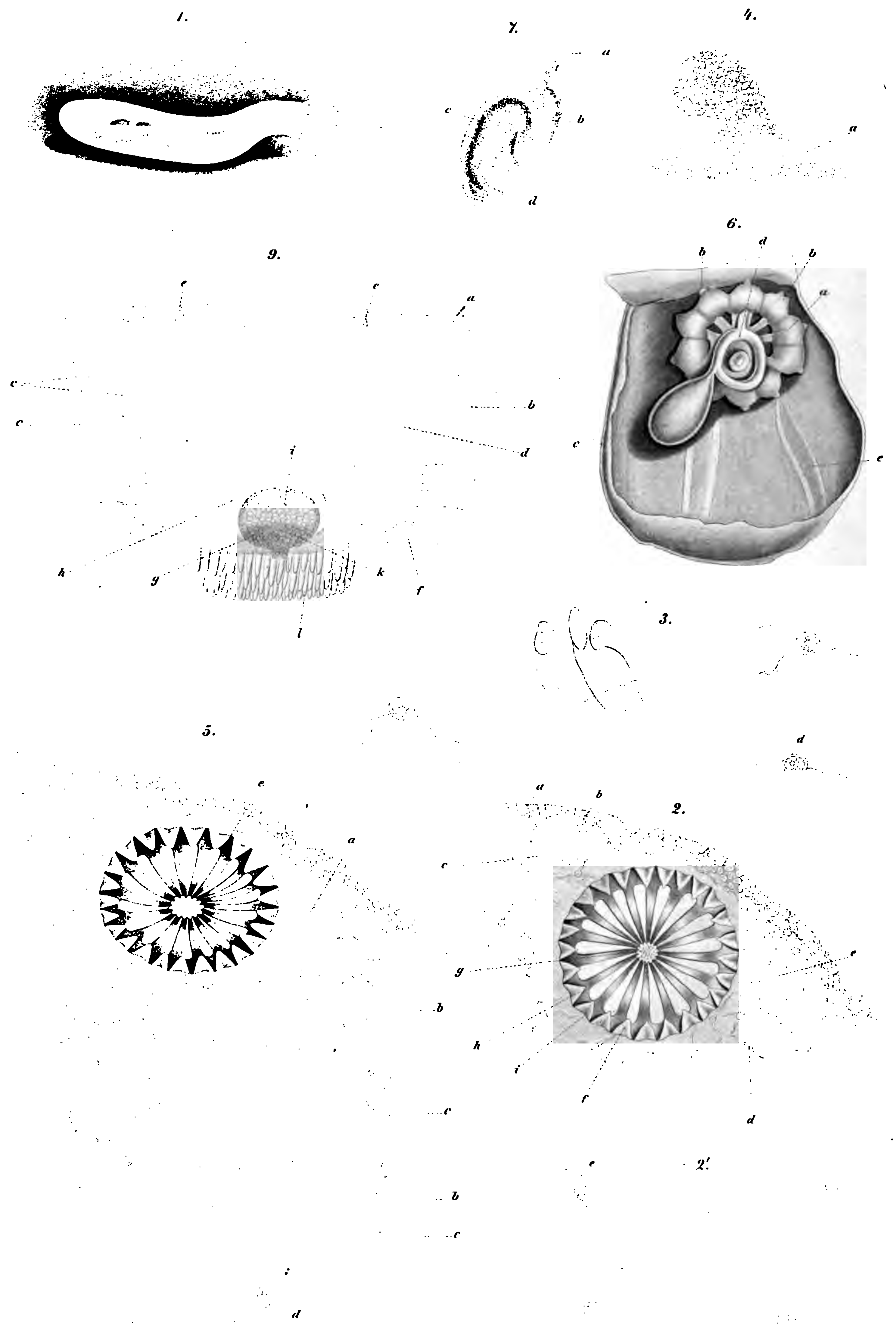
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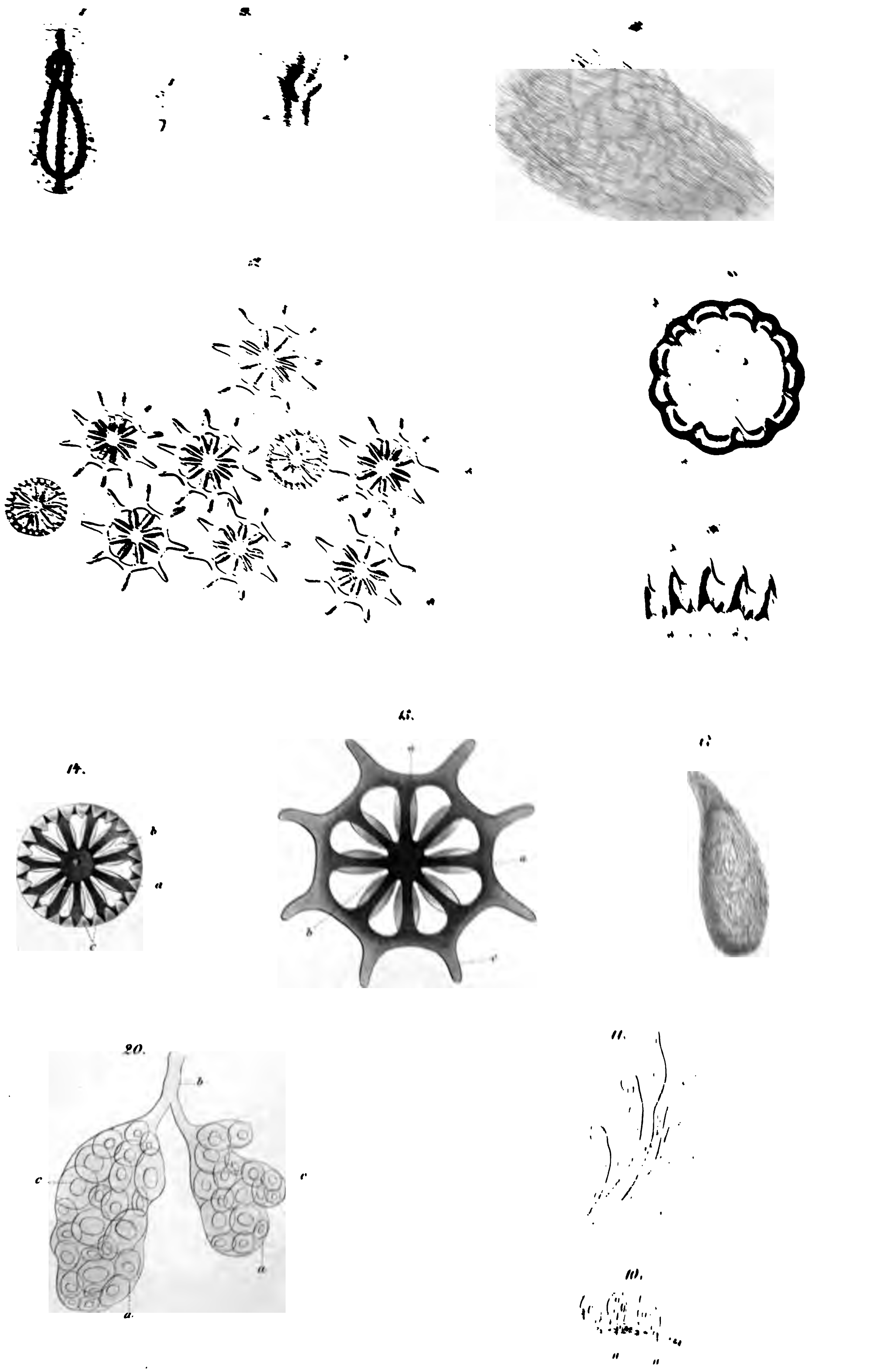


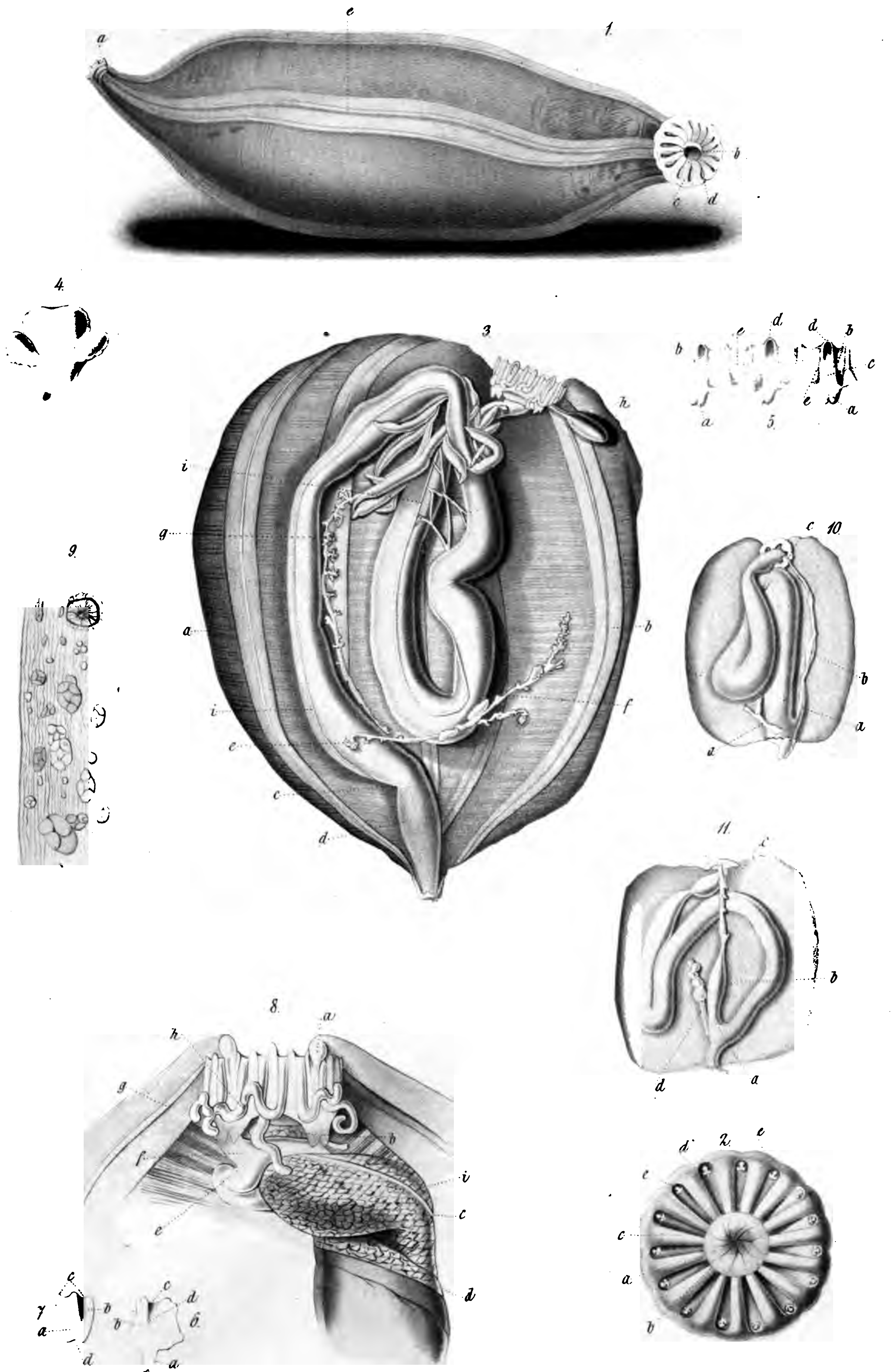
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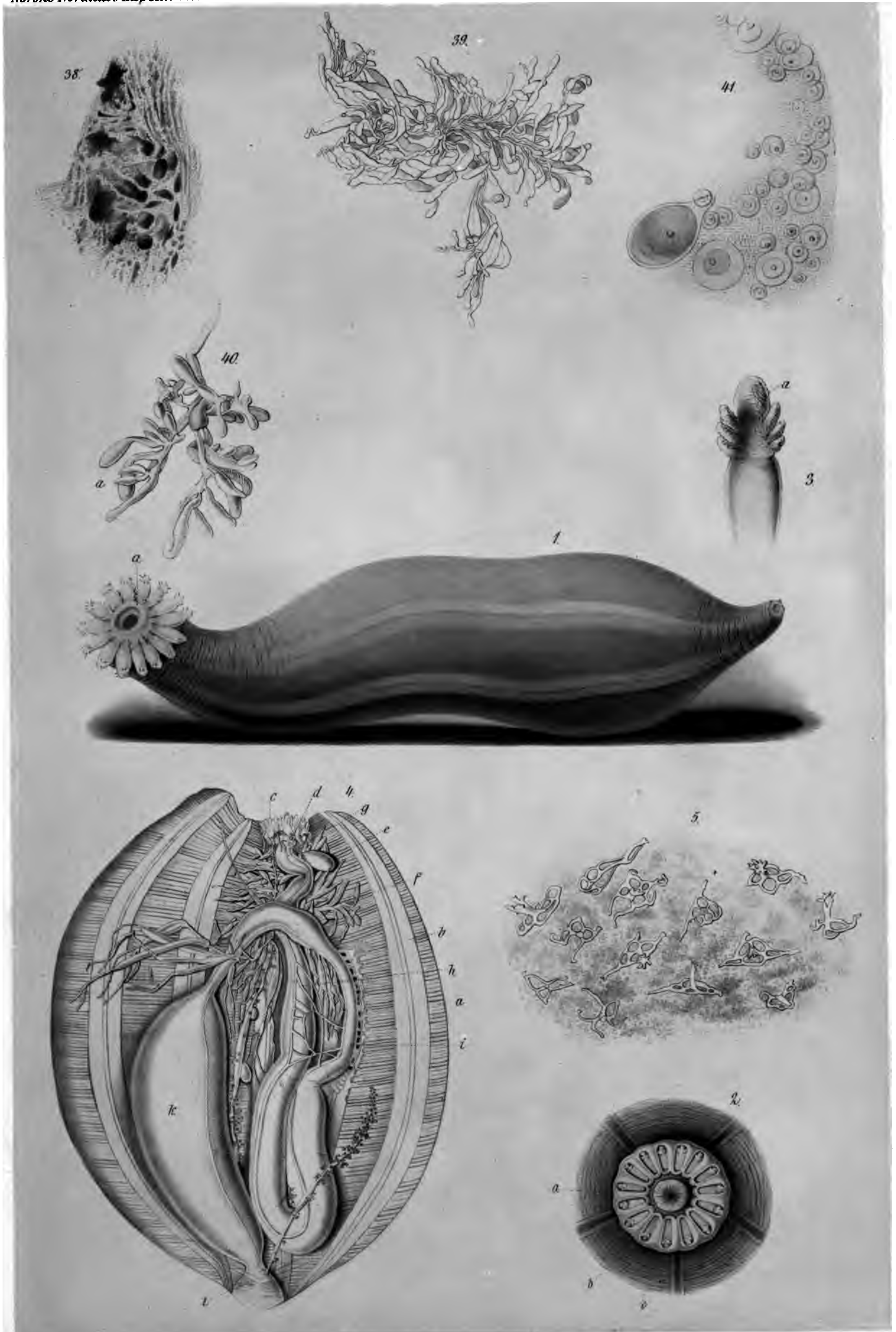
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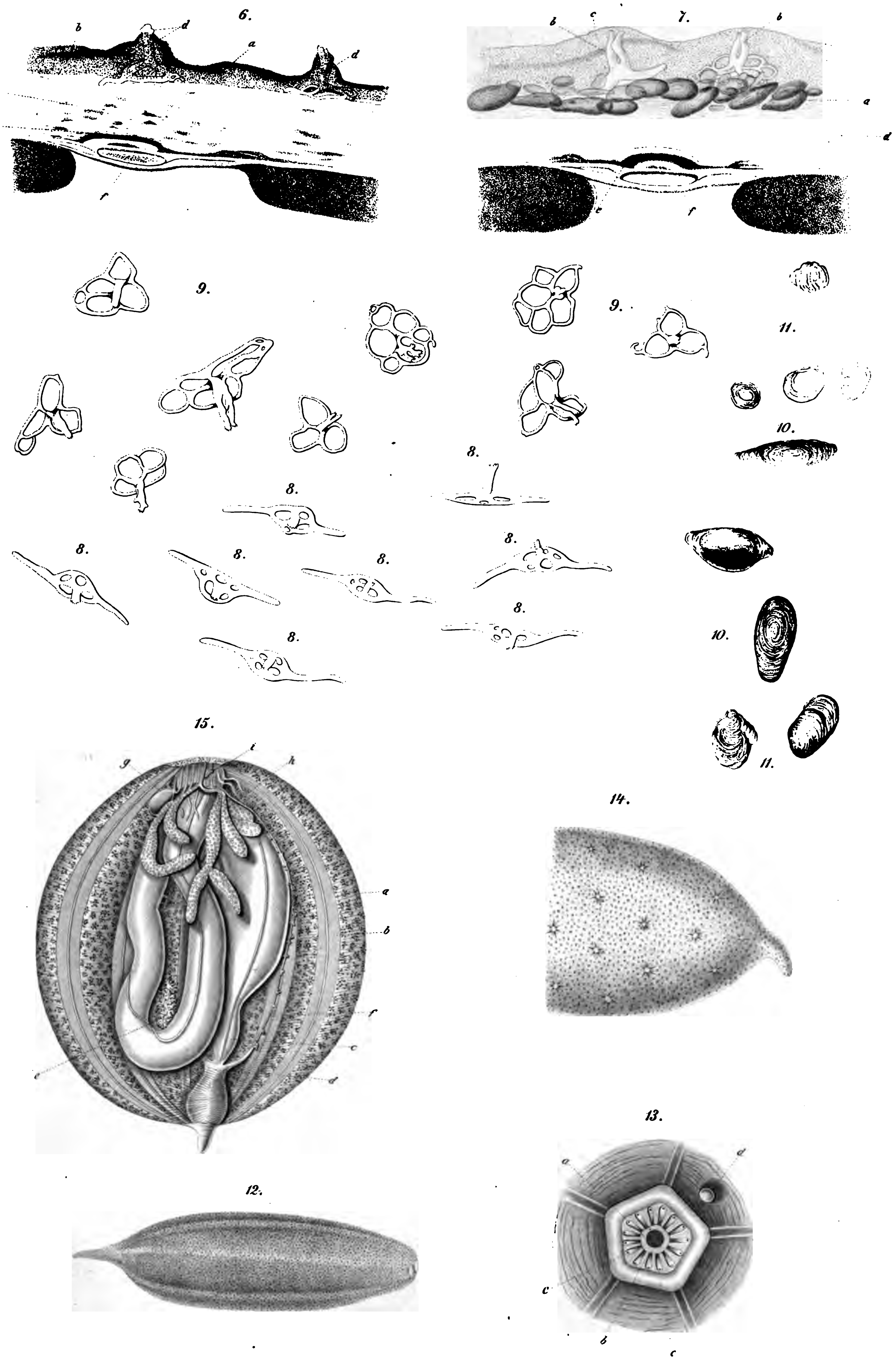

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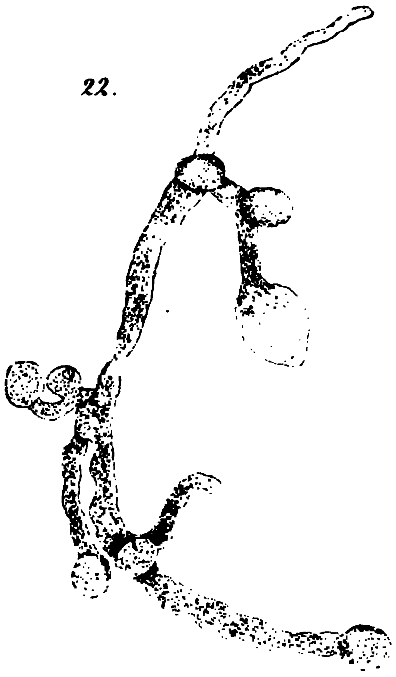


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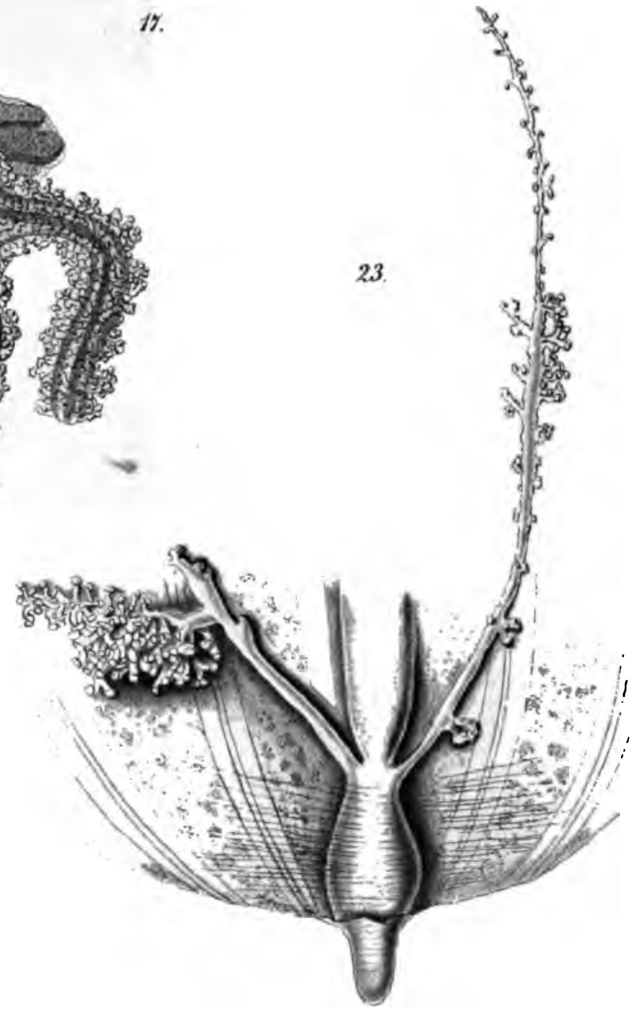
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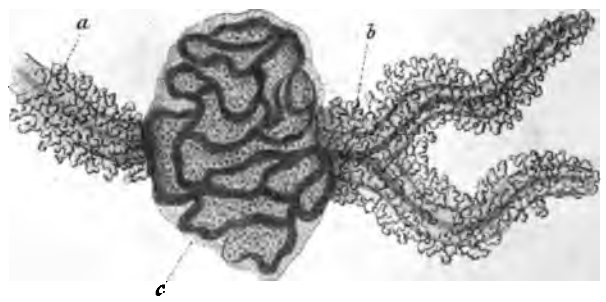
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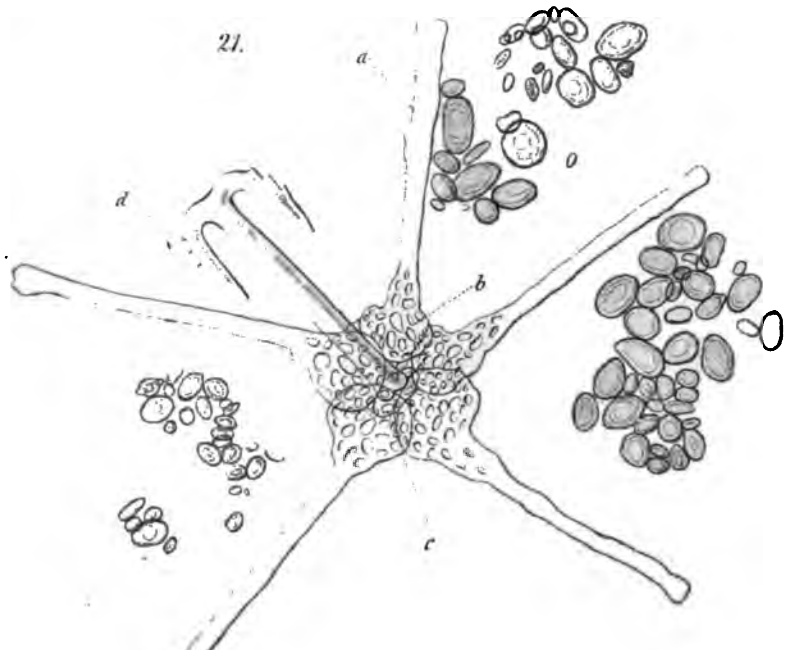
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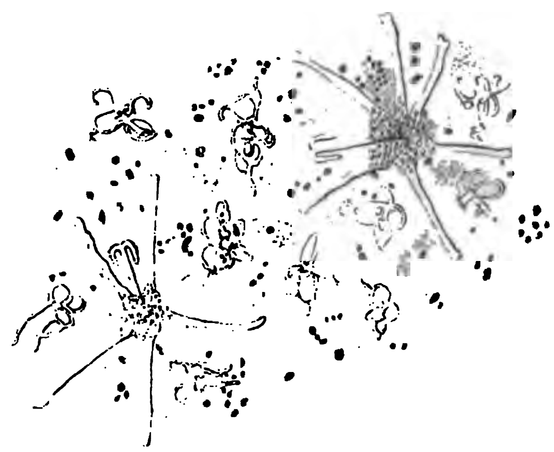


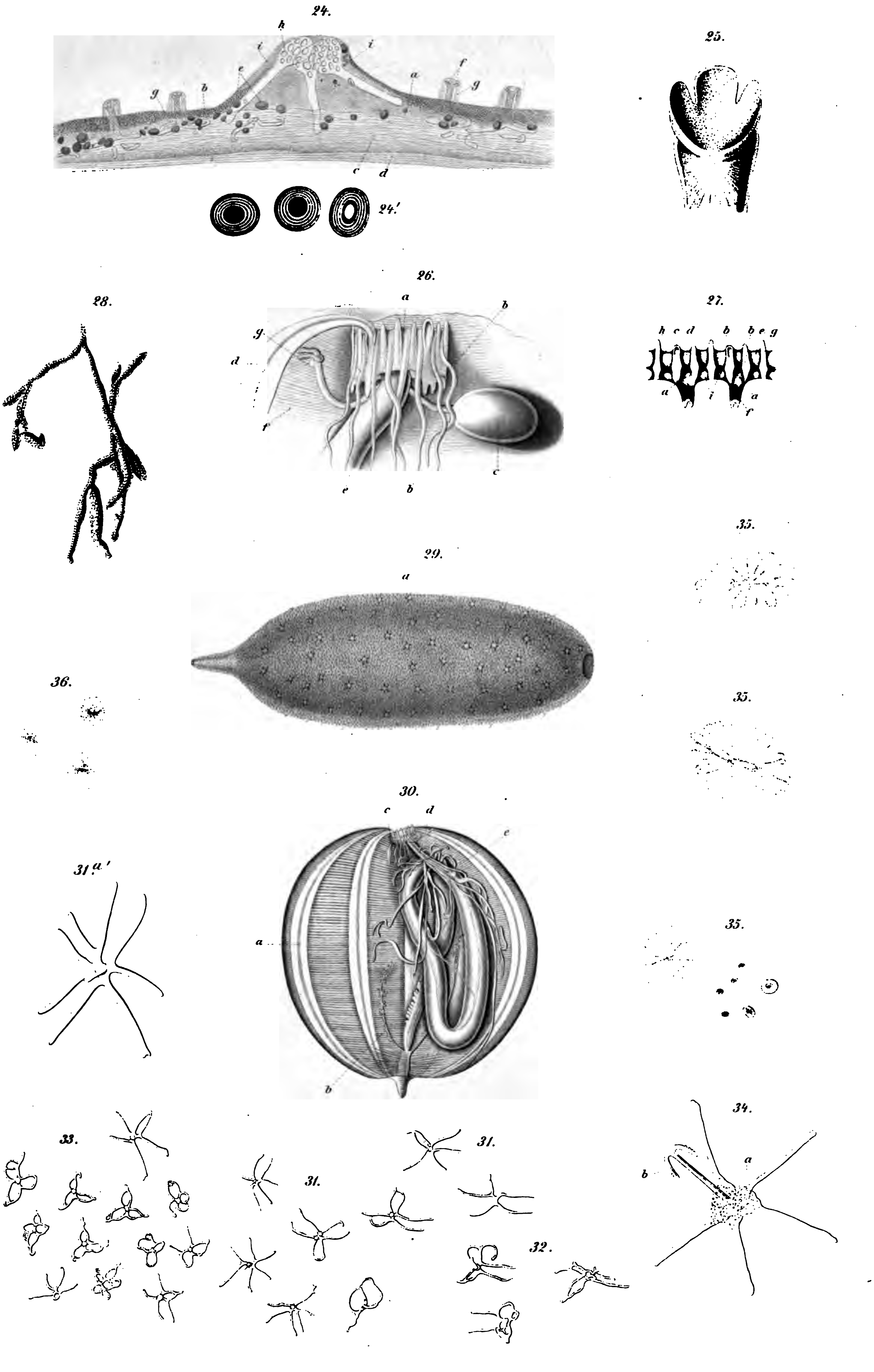


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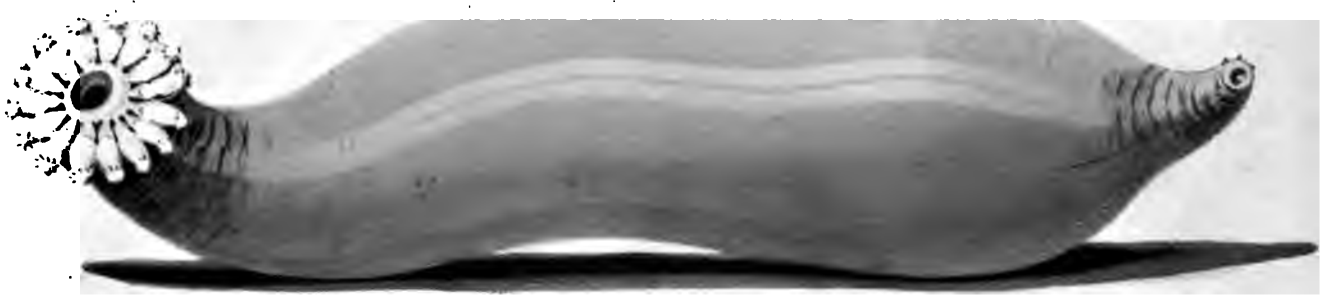
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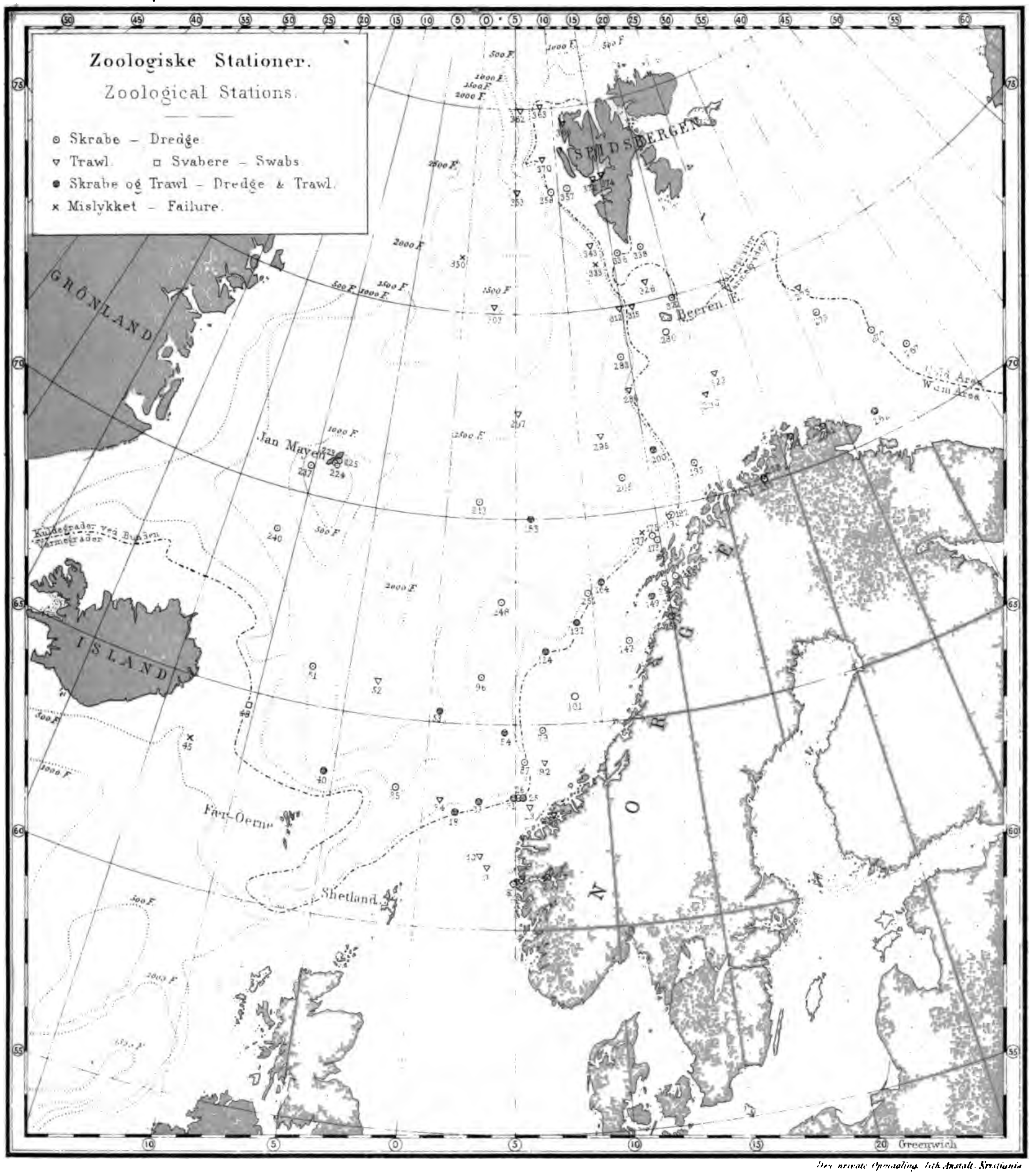
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THE NORWEGIAN NORTH-ATLANTIC EXPEDITION

1876—1878.

VI.

ZOOLOGY.

HOLOTHURIOIDEA,

BY

D. C. DANIELSSEN AND **JOHAN KOREN.**

WITH 13 PLATES AND 1 MAP.

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